

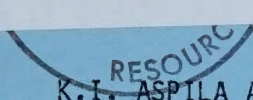
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**LRTAP INTERCOMPARISON STUDY L 5:
MAJOR IONS, NUTRIENTS AND
PHYSICAL PROPERTIES IN WATER**

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JULY 1984

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by

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Nutrients and Physical Properties in Water

K.I. Aspila and S. Todd

EXECUTIVE SUMMARY

The Canadian LRTAP program (long range transport of atmospheric pollutants) involves many different laboratories who individually produce data for regional or national objectives. If these data are to be merged or if they are to be used to establish long-term trends it is imperative that the data be verified as comparable between laboratories and that laboratories have produced data in a controlled and unbiased manner. This report describes a fifth interlaboratory study that addresses these issues.

This study consisted of 10 water samples and was distributed to 54 laboratories who were requested to analyze for 12 different constituents. Data provided were analyzed for bias by the rank order method of Youden. Results which deviated significantly from interlaboratory medians were flagged.

This report is a compilation of all results received and evaluated. The individual laboratory appraisals that were provided to participants on April 2, 1984 are included. It is hoped, where warranted, that individual laboratories have taken appropriate corrective action in their measurement process.

ABSTRACT

This report is a compilation of results received and evaluated for LRTAP interlaboratory study L-5. The report includes all laboratory specific appraisals that had been provided earlier (April 2, 1984) to laboratory heads and project managers. The study consisted of 10 samples of which six were natural waters derived from LRTAP watershed programs or precipitation networks. One sample was from Lake Superior and the other three were synthetic. Laboratory data sets were appraised for bias by the rank order method of Youden. Individual sample results were flagged if deviating significantly from interlaboratory median values. The parameters included Ca, Mg, Na, K, Cl, SO₄, acidity, total alkalinity, gran alkalinity, pH, specific conductance, colour, reactive silica and NO₃ plus NO₂. Included in this report is a brief comparison of bias and flag frequency for each participant in studies L-1, L-3, L-4 and L-5.

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INTRODUCTION

The long range transport of atmospheric pollutants (LRTAP) program involves many different laboratories that contribute data for various project objectives. If the data are to be merged or used for identifying year to year trends or for acid rain impact studies, then it is necessary that laboratories be defined as in control and comparable. This interlaboratory study addresses these issues. The merits and impact of interlaboratory studies are described elsewhere (1,2,3).

Background of Study

This study was organized during the summer and fall of 1983. It was distributed to client laboratories in December 1983 and had a January 31, 1984 deadline assigned. Not all participants reported on schedule. The appraisals in this report were provided earlier to each participant during the first week of April 1984 and reflect laboratory performance during that time frame: December 1983 to March 1984. All laboratories who exhibited bias or erratic results have hopefully taken internal action to review and correct their measurement process.

Release of Laboratory Codes

Laboratories that participated in this study are identified, by their affiliations, at the end of this report. The individual

results in Appendix I and the appraisals compiled in Appendix II have laboratories identified by their laboratory number. The key to these codes, although confidential, is available on a need to know basis. Users of data and program managers are encouraged to seek out the source of their data and openly discuss issues of quality with their client laboratories.

Design of the Study

The study comprized of 10 different water samples distributed to over 50 laboratories. The samples are described in Table 1. Several were recycled from an earlier study. Their inclusion has merit as they assist in verifying stability and allow individual laboratories who exhibited poor results to update and verify performance.

Table 1: Test Samples Used in Study L-5

Sample Number	Source of Water	Previous Use in Study L-1
1	Keji-Brown, Nova Scotia	
2	Montmorency, Quebec	L-4 (#5)
3	Lac LaFlamme, Quebec	
4	Moncton, New Brunswick	
5	Precipitation (Composite)	L-4 (#9)
6	Precipitation (Composite)	
7	Synthetic	
8	Synthetic	L-4 (#7)
9	Lake Superior, Ontario	L-4 (#10)
10	Synthetic	

Preparation of Samples

Test sample bottles for this study were 500 mL linear polyethylene. These were either new bottles or bottles recycled from earlier studies. All bottles were washed with chromerge, tap water rinsed and then thoroughly rinsed with distilled water. They were then filled with distilled deionized water and stored 1 week to 50 weeks before use.

Forty litre aliquots of stock samples (see Table 1) were obtained by syphoning from stock waters (100 to 200 litres) maintained in permanent storage at 4°C. The 40 litre substocks were mixed vigorously and 400 mL units serially transferred to the clean bottles. Samples so prepared were all stored at 4°C until distributed to the participants.

Evaluation of Data

Interlaboratory data sets were evaluated for bias by the nonparametric rank order method of Youden (4,7) which had been modified by Clark (2,5) to allow for computerized evaluation. A set of data is said to be biased when it exhibits a tendency to be higher or lower than some standard. The standard for these studies is the performance of all participating laboratories. For these studies there is about a 1 chance in 20 of deeming a laboratory set biased when it is not.

In addition to bias, results on each individual sample were evaluated by flagging results that deviated significantly from the interlaboratory medians. This process is described elsewhere (study L-1, L-2, and References 2 and 5). The criteria for flagging is given in Table 2.

To assist in evaluating data, analysts were requested to report all their calculated results and to use the codes W and T where appropriate. This format is described in study L-1 and L-2 and found in a recent ASTM Standard Practice (6).

RESULTS AND DISCUSSION

General

Laboratory results, brief method statements, bias and assigned flags are provided in Appendix I. Laboratories that were assigned bias are in most situations in error due to calibration. Flags assigned on individual samples reflect, in most cases, a lack of precision in the method applications. Those laboratories assigned a high frequency of bias (based on whole data sets) as well as a high percentage of results flagged have hopefully taken appropriate internal corrective action (8). The appraisals had been provided shortly after the completion of the study. A compilation of all appraisals is given in Appendix II.

Table 2: Summary of criteria used for flagging results*

Constituent	LLBAE				BAE				CEI			
	L-1	L-3	L-4	L-5	L-1	L-3	L-4	L-5	L-1	L-3	L-4	L-5
Ca	5	2.5	2.5	2.5	0.25	0.188	0.15	0.15	0.10	0.096	0.08	0.08
Mg	1.0	1.0	1.0	1.0	0.15	0.046	0.05	0.05	0.10	0.099	0.10	0.10
Na	3	0.5	0.50	0.50	0.4	0.2	0.20	0.20	0.10	0.15	0.14	0.14
K	0.5	0.50	0.20	0.20	0.15	0.13	0.05	0.05	0.10	0.108	0.16	0.16
Cl-1C	-	-	1.5	1.5	-	-	0.25	0.25	-	-	0.15	0.15
Cl-non 1C	-	-	1.5	1.5	-	-	0.25	0.25	-	-	0.15	0.15
Cl (Total)	5	1.5	1.5	1.5	0.50	0.26	0.25	0.25	0.05	0.178	0.15	0.15
SO ₄ -1C	-	-	2.0	2.0	-	-	0.76	0.76	-	-	0.20	0.20
SO ₄ -non 1C	-	-	2.0	2.0	-	-	0.76	0.76	-	-	0.20	0.20
SO ₄ (Total)	5	6.0	2.0	2.0	0.5	0.746	0.76	0.76	0.10	0.168	0.20	0.20
Acidity	1.0	1.0	1.0	1.0	1.0	0.75	0.75	0.75	0.10	0.50	0.50	0.50
Total Alka	0	2.5	2.5	2.5	1.25	1.19	1.20	1.20	0.10	0.086	0.08	0.08
Gran. Alka	-	-	0.05	0.05	-	-	0.50	0.50	-	-	0.10	0.10
pH	7	0	0	0	0.25	0.25	0.25	0.25	0	0	0	0
Spec. Cond	0	50	50	50	2.5	2.82	2.8	2.8	0.05	0.078	0.08	0.08
Colour	5	5	5	5	5	2.03	2.2	2.6	0.10	0.182	0.18	0.20
Si	0.2	0.10	0.1	0.10	0.05	0.05	0.05	0.05	0.10	0.067	0.08	0.08
NO ₃ +NO ₂	0.2	0.05	0.5	0.50	0.05	0.024	0.025	0.25	0.10	0.142	0.20	0.20
Ba	-	-	0.01	-	-	-	0.005	-	-	-	0.10	-
DOC	1.0	5.0	3.0	-	1.0	2.03	1.5	-	0.10	0.182	0.20	-

*Criteria cited for study L-3 above, differs slightly from that used when the initial appraisals were prepared in August 1983 and mailed to participants. The parameters involved are pH, silica, acidity and Na.

LLBAE = lower limit for use of basic acceptable error.

BAE = basic acceptable error.

CEI = concentration error increment.

Shortly after samples for this study were distributed, it became evident that one sample had been acidified with nitric acid. A letter was then sent to all analysts with a caution to expect high nitrate and a very low pH. When the study was completed and the data reviewed, it was decided to reject this sample and make all bias and flag evaluations on only the remaining nine samples. The data in Appendix I and the appraisals in Appendix II reflect this change. Some analysts noted, after the study was completed, that a very acidic sample can influence sensitivity in some methods. This influence, a memory effect, may have been responsible for a few high values for nitrate plus nitrite.

Flags and Bias

As with the previous studies a flagging technique was applied to identify individual laboratory results that deviated significantly from the interlab median values. A discussion on the process is found elsewhere (2, 7). The criteria used for this study was almost the same as that used in the two earlier studies L-3 and L-4. These criteria are summarized in Table 2. An example of how flags are assigned is found in Appendix III.

Bias is defined from whole data sets (all labs and samples) by the Youden rank-order technique described elsewhere (4, 5). The reader should note that assigning flags on sample results and discerning bias from whole data sets are two separate and distinctly

different procedures. The impact of flag and bias evaluations in this study is summarized in Table 3. This table had been provided to participants April 2, 1984 when the laboratory appraisals were distributed.

Comparison of Results to Earlier Studies

The interlaboratory median values found in Appendix I are summarized in Table 4. Several of these samples were recycled reference waters used earlier in study L-4. A comparison of results from study L-4 to those found in L-5 is given in Table 5. Overall the comparison is excellent and helps to verify the stability of the constituents.

OVERALL STUDY TO STUDY PERFORMANCE

General

Managers of projects, laboratory heads and analysts very often ask if their laboratory performance is comparable with their peers or if their performance is improving. Such issues are often raised after studies are completed or after new and improved quality control procedures (8) have been employed. The following discussion on study L-5, relative to earlier studies, is provided to address such questions.

Table 3. Summary of Performance (Study L-5) December '83 to March '84

Lab Code	Number of Parameters Analyzed	Bias		Flags		
		Number of Bias Statements	Percentage of Parameters Biased (%)	Number of Results	Number of Flags Assigned	Percentage of Results Flagged (%)
L002	12	1	8.3	107	7	6.5
L003	14	1	7.1	93	12	12.9
L004	12	4	33.0	108	26	24.1
L006	11	4	36.0	89	17	19.1
L007	5	1	20.0	40	12	30.0
L009	9	1	11.0	71	9	12.6
L010	13	2	15.8	87	9	10.3
L010B	1	0	0	8	0	0
L011	12	2	16.7	84	17	20.2
L012	1	0	0	9	0	0
L013	9	0	0	72	1	1.38
L014	11	0	0	87	16	18.4
L016	9	3	33.0	81	15	18.5
L018	4	2	50.0	34	9	26.5
L019	10	0	0	85	1	1.2
L020	13	0	0	103	11	10.7
L021	9	4	44.0	81	10	12.3
L022	13	5	38.5	95	32	33.7
L023	13	0	0	95	11	11.6
L024	13	0	0	101	7	6.9
L025	9	1	11.0	72	11	15.3
L027	13	1	7.7	100	17	17.0
L028	2	1	50.0	18	9	50.0
L029	12	2	16.7	97	6	6.2
L030	7	0	0	54	4	7.4
K031A	12	0	0	90	5	5.5
L031B	5	0	0	8	0	0
L032	16	3	18.7	128	29	22.6
L033	12	1	8.3	63	17	26.9
L042	10	4	40.0	90	38	42.2
L045	13	1	7.7	108	5	4.6
L046	13	4	30.3	107	25	23.4
L048	13	0	0	114	12	10.5
L049	13	2	15.4	101	30	29.7
L050	4	0	0	36	4	11.1
L053	10	0	0	90	1	1.0
L057	12	2	16.7	102	19	18.6
L058	12	0	0	102	8	7.8
L060	12	5	41.8	103	37	35.9
L061	11	0	0	33	2	6.0
L062	14	4	28.6	121	33	27.3
L063	14	2	14.3	128	33	25.8
L064	11	0	0	97	24	24.4
L066	10	0	0	86	12	13.9

44 LABS

Table 4. Interlaboratory Median Values for Test Samples

Parameter	Median Values on Samples 1 to 10									
	1	2	3	4	5	6	7	8	9	10
Calcium mg Ca/L	.67	1.75	2.2	16.7	.99	1.5	26.2	.31	13.0	42.2
Magnesium mg Mg/L	.43	.46	.49	4.4	.21	.33	7.6	.07	2.7	9.3
Sodium mg Na/L	3.15	2.4	.99	3.02	.21	.30	4.1	.51	1.3	19.2
Potassium mg K/L	.28	.17	.16	.62	.12	.15	2.4	.32	.50	.90
Chloride mg Cl/L I.C.	5.11	3.2	.27	4.4	.64	.91	6.9	1.5	1.3	106.0
Chloride mg Cl/L non I.C.	5.0	3.0	.4	3.9	.67	.90	6.8	1.5	1.3	104.5
Chloride mg/Cl combined	5.1	3.2	.36	4.1	.64	.903	6.84	1.5	1.3	105.0
Sulfate mg SO ₄ /L I.C.	2.92	3.45	3.49	16.1	4.9	5.4	19.3	.31	3.4	37.9
Sulfate mg SO ₄ /L non I.C.	3.10	4.5	3.6	13.1	4.9	5.4	19.2	.43	3.2	36.5
Sulfate mg SO ₄ /L combined	2.97	3.5	3.5	14.8	4.9	5.4	19.21	.32	3.3	37.4
Acidity mg CaCO ₃ /L	2.5	2.6	1.7	1402	4.6	4.5	1.2	1.5	1.6	1.8
Total Alkalinity mg CaCO ₃ /L	1.5	2.8	5.1	.25	.75	.75	82.0	1.0	41.0	1.45
Gran Alkalinity mg CaCO ₃ /L	.225	1.82	4.6	0.0	-2.7	-1.9	81.5	.15	40.7	-.02
pH	5.3	6.3	6.8	1.7	4.3	4.4	8.0	5.7	7.7	5.5
Specific Conductivity umho/cm	29.6	27.6	22.4	10950	35.6	36.5	222	8.1	94.0	446
Colour (Hazen Units)	20.0	37.5	10.0	45.0	5.0	2.5	2.5	2.0	2.5	4 2.5
Reactive Silica mg Si/L	.398	2.8	2.8	1.2	.041	.087	.56	.033	1.10	.012
Nitrate + Nitrite mg N/L	.010	.09	.099	398	.56	.76	.44	.009	.302	.03

*Note: Sample 4 was omitted from the data evaluation process.

Table 5. Comparison of Interlaboratory Median Values on Four Samples
between Studies L-4 and L-5

Source and Study No.	Lake Superior		Bulk Rain		Montmorency		Synthetic	
Parameter	L4-10	L5-9	L4-9	L5-5	L4-5	L5-2	L4-7	L5-8
Calcium mg Ca/L	13.0	13.0	.97	.99	1.75	1.76	.30	.31
Magnesium mg Mg/L	2.7	2.7	.21	.21	.47	.46	.07	.07
Sodium mg Na/L	1.2	1.3	.20	.21	2.4	2.4	.52	.52
Potassium mg K/L	.50	.50	.12	.12	.17	.17	.32	.32
Chloride mg Cl/L	1.2	1.3	.60	.65	3.1	3.2	1.50	1.50
Sulfate mg SO ₄ /L	3.3	3.3	4.8	4.9	3.4	3.4	.38	.31
Acidity mg CaCO ₃ /L	1.0	1.6	4.4	4.6	2.49	2.6	1.6	1.5
Alkalinity mg CaCO ₃ /L	40.0	41.0	-	-	1.80	1.82	1.5	1.0
pH	7.7	7.7	4.3	4.3	6.25	6.3	5.6	5.7
Specific Conductivity umho/cm	93.0	94	33.9	35.6	27.6	27.6	7.8	8.1
Colour Hazen Units	4.0	2.5	4.0	5.0	35.0	37.5	30.0	2.0
Silica mg Si/L	1.10	1.10	.04	.04	3.0	2.8	.04	.033
Nitrate/Nitrite mg N/L	.30	.30	.56	.56	.10	.09	.009	.009

The approach taken involves a review and tabulation of the bias and flags assigned. These two items have been the central issue in the evaluation of LRTAP studies L-1 to L-5. Satisfactory performance in this peer group is recognized in a laboratory when whole lab data sets are not discerned as biased (2, 4, 5) and the study results are seldom flagged (2, 5). Poor performance is recognized when a lab is very frequently biased and very often flagged.

To discern the relative performance of a lab over four studies (L-1, L-3, L-4 and L-5), the approach taken in this report is a followup of that introduced in study L-4. The percent frequency of bias and percent flags are calculated with the formula given below.

$$\% \text{ Bias} = \frac{\text{Total No. of Bias Statements for a Lab}}{\text{No. of Parameters Analyzed}} \times 100$$

$$\% \text{ Flags} = \frac{\text{Total No. of Flags by a Lab}}{\text{Total No. of Rankable Results}} \times 100$$

A summary of the frequency of bias and of flags is given in Table 6. The results relate to only rankable data reported by each lab and applies to the following parameter group: Ca, Mg, Na, K, Cl, SO₄, total alkalinity, Gran alkalinity, acidity, pH, conductance, silica, colour and NO₃ + NO₂. A vast majority of laboratories measured 10 to 14 of these 14 parameters.

Table 6. Variation in % Bias and % Flags

Lab Code	% Bias (for parameter data set)				% Flags (on all ranked results)			
	L-1	L-3	L-4	L-5	L-1	L-3	L-4	L-5
L002	30.7	25.0	7.7	8.3	5.9	11.7	7.7	6.5
L003	25.0	8.3	0.0	7.1	14.7	7.6	10.9	12.9
L004A	45.5	27.3	27.3	33.0	16.7	21.0	22.1	24.1
L004B	-	-	27.3	-	-	-	32.7	-
L006	36.4	36.4	54.6	36.0	32.6	11.9	19.2	19.1
L007	50.0	44.4	-	20.0	33.6	46.3	-	30.0
L009	22.2	10.0	14.3	11.0	23.3	10.0	4.0	12.6
L010A	-	15.4	23.1	15.8	-	20.3	25.9	10.3
L010B	-	-	-	0.0	-	0	0	0.0
L011	41.7	23.1	36.4	16.7	11.8	20.8	21.6	20.2
L012	20.0	-	-	0.0	13.8	-	-	0.0
L013A	30.0	0.0	0.0	0.0	12.4	5.6	6.3	1.4
L013B	-	-	0.0	-	-	-	6.2	-
L014	16.7	16.7	10	0.0	12.0	17.0	17.7	18.4
L016	20.0	33.0	44.4	33.0	22.5	22.2	23.1	18.5
L018	-	-	-	50.0	-	-	-	26.5
L019	-	-	-	0.0	-	-	-	1.2
L020	33.3	27.3	0.0	0.0	17.9	12.6	13.6	10.7
L021A	45.4	556	-	-	40.3	44.2	-	-
L021B	33.0	-	44.4	44.0	43.1	-	25.3	12.3
L022	38.5	46.2	46.2	38.5	13.2	30.2	26.5	33.7
L023	30.8	0.0	7.7	0.0	24.8	12.0	6.0	11.6
L024	18.2	18.2	8.3	0.0	10.3	11.1	6.2	6.9
L025	-	15.4	0.0	11.0	-	12.8	11.0	15.3
L027	16.7	-	-	7.7	4.2	-	-	17.0
L028	-	-	-	50.0	-	-	-	50.0
L029	41.7	16.7	16.7	16.7	13.8	13.3	5.6	6.2
L030	-	-	33.0	0.0	-	-	9.4	9.4
L031A	7.1	8.3	16.7	0.0	1.8	7.0	14.1	5.5
L031B	-	-	-	0.0	-	-	-	0.0
L032	28.6	0.0	0.0	18.7	23.0	23.1	9.2	22.6
L033	-	23.1	9.1	8.3	-	38.7	19.7	26.9
L040	33.0	-	-	-	22.6	-	-	-
L041	-	16.7	-	-	-	3.4	-	-
L042	-	22.2	20.0	40.0	-	24.4	27.8	42.2
L044	-	33.3	44.4	-	-	32.2	36.8	-
L045	23.1	8.3	41.7	7.7	7.4	7.2	8.9	4.6
L046	-	38.5	15.4	30.3	-	24.2	17.2	23.4
L048	-	-	-	0.0	-	-	-	10.5
L049	-	-	-	15.4	-	-	-	29.7
L050	-	-	-	0.0	-	-	-	11.1
L053	11.1	-	22.2	0.0	2.1	-	6.1	1.0
L054	71.4	12.5	-	-	24.0	27.0	-	-
L056	66.7	30.0	-	-	63.1	42.7	-	-
L057	40.0	33.3	50.0	16.7	22.9	44.1	37.7	18.6
L058	0.0	8.3	27.3	0.0	0.5	8.9	10.7	7.8
L060	-	50.0	72.7	41.8	-	34.5	42.9	35.9
L061	-	-	11.0	0.0	-	-	8.2	6.0
L062	-	-	-	28.6	-	-	-	27.3
L063	-	-	-	14.3	-	-	-	25.8
L064	-	-	-	0.0	-	-	-	14.4
L066	-	-	-	0.0	-	-	-	13.9

A quick overview of results in Table 6 reveals some labs with a unique capability of having few, if any flags, and being frequently discerned without bias. Such labs are indeed satisfactory. On the other hand some labs are very frequently biased and have a rather large number of results flagged. These labs are considered poor in this peer group assessment. They are not very comparable and may need a review of their internal quality control strategies.

Single Study Performance

In a single study (e.g. 10 samples, 30 labs, 14 constituents), the separation of laboratory performance requires criteria. The following criteria are suggested:

Satisfactory if % bias is < 15 % and % flags < 10%

Moderate if % bias is > 15 or < 35% and % flags > 10% or < 25%

Poor if % bias is > 35% and % flags > 25%

The above criteria are but guidelines to allow a laboratory within a peer group to reflect its own performance relative to its peers.

Performance over Several Studies

The performance of a laboratory in one study is one matter. Continuity and improvements in performance over many studies is perhaps more important as it provides credibility to program data that are often merged or used in definition of environmental trends. The criteria suggested to define study to study performance is given below.

Satisfactory if	% bias + % flags	< 25%
Moderate if	% bias + % flags	> 25% or < 60%
Poor if	% bias + % flags	> 60%

Discussion on Performance

The decision to overview the performance of laboratories based on the occurrence of flags and bias in four studies has merit and is plausible for various reasons. For instance

- all participants represent a peer group with each lab having a similar capability in handling soft surface waters.
- all four studies (with the exception of study L-1) had a similar series of water samples.
- the criteria used to assign flags on the samples were virtually the same for all studies.
- almost all laboratories analyzed the 14 constituents under review.

The summation of percent bias and percent flags for each lab in each study is given in Table 7. Beside each lab is given a very brief statement of overall performance. This relative performance reflects these labs addressing the 10 to 14 constituents listed in Table 5. The criteria to assign satisfactory or poor is defined above.

A review of Table 7 reveals about 16 of the 52 laboratories as satisfactory and approximately eight laboratories as consistently poor. The majority of labs are moderate and reveal occasional bias and have about 1 in 4 or 5 results flagged. It is of interest to note that laboratories found as satisfactory include the large facilities that contribute the majority of data to the Federal-Provincial LRTAP program. This is encouraging.

Some caution is suggested in overreaction to the notation, poor performance. This term is technically correct and identifies laboratories whose frequency of bias and flags are somewhat extreme relative to those six to ten labs who are consistently without bias and are seldom if ever flagged. These labs labelled poor should review their internal control process and relate closely with their users of data. The users of data should recognize that if the overall designation is poor their labs may still have very good data on the constituents of interest. In this context, lab L028 is a good example. It provided data on only two parameters and was flagged and biased. Because of the nature of the in-lab analytical test and the lab protocol, a suitable blank correction was not made. Had it been

Table 7. Summary of Performance

Lab Code	% Bias + % Flags on LRTAP Studies*				Comments
	L-1	L-3	L-4	L-5	
L002	36.6	36.7	15.4	14.1	satisfactory and <u>improving</u>
L003	39.7	15.9	10.9	20.0	moderate to satisfactory
L004A	62.2	48.3	49.4	57.1	poor to moderate
L004B	-	-	60.0	-	<u>poor</u>
L006	68.0	47.3	73.8	55.1	<u>poor</u>
L007	83.6	90.7	-	50.0	poor to moderate
L009	45.5	20.0	18.3	23.6	satisfactory
L010A	-	35.7	49.0	26.1	moderate to satisfactory
L010B	-	-	-	0.0	-
L011	53.5	43.9	58.0	36.9	moderate
L012	33.8	-	-	0.0	moderate and <u>improving</u>
L013A	35.6	5.6	6.3	1.4	satisfactory and <u>improving</u>
L013B	-	-	6.2	-	-
L014	28.7	33.7	27.7	18.4	moderate and <u>improving</u>
L016	42.5	55.2	57.5	51.5	moderate (little change)
L018	-	-	-	76.5	<u>poor</u>
L019	-	-	-	1.2	satisfactory
L020	51.2	39.9	13.6	10.7	moderate to satisfactory (improving)
L021A	85.7	99.8	-	-	poor on two studies
L021B	76.1	-	69.7	56.3	poor to moderate
L022	51.7	76.4	72.7	72.2	<u>poor</u>
L023	55.6	12.0	13.7	11.6	satisfactory
L024	28.5	29.3	14.5	6.9	moderate to satisfactory (improving)
L025	-	28.2	11.0	26.3	satisfactory
L027	20.9	-	-	24.7	satisfactory
L028	-	-	-	100.0	<u>poor</u> (on two constituents)
L029	65.5	30.0	22.3	22.9	poor to satisfactory and <u>improving</u>
L030	-	-	42.4	7.4	moderate to satisfactory (<u>improving</u>)
L031A	8.9	15.3	30.8	5.5	satisfactory
L031B	-	-	-	0.0	satisfactory
L032	51.6	23.1	9.2	41.3	moderate to satisfactory (variable)
L033	-	61.8	28.8	35.2	poor to moderate
L040	55.6	-	-	-	moderate
L041	-	20.1	-	-	satisfactory (1 study)
L042	-	46.6	47.8	82.2	moderate to poor (needs attention)
L044	-	65.5	81.2	-	<u>poor</u>
L045	30.5	15.5	50.6	12.3	moderate to satisfactory (variable)
L046	-	62.7	32.6	53.7	poor to moderate
L048	-	-	-	10.5	satisfactory
L049	-	-	-	45.1	moderate
L050	-	-	-	11.1	satisfactory
L053	13.2	-	28.3	1.0	satisfactory
L054	95.4	39.5	-	-	poor to moderate
L056	129.8	72.7	-	-	<u>poor</u>
L057	62.9	77.4	87.1	35.3	poor to moderate
L058	0.5	17.2	38.0	7.8	satisfactory
L060	-	184.5	115.6	77.7	<u>poor</u>
L061	-	-	19.2	6.0	satisfactory
L062	-	-	-	55.9	moderate
L063	-	-	-	39.1	moderate
L064	-	-	-	14.4	satisfactory
L066	-	-	-	13.9	satisfactory

Note: * The column of data are the summation of % bias and % flags abstracted from Table 6.

possible, this lab would have appeared satisfactory. Another example is lab L061. This lab, for reasons of internal protocol, provided results on only three of the ten samples. The absent data did not allow for an assessment of bias. The data in Table 7 reflects only flags for study L-5. These examples suggest that users of data need to carefully relate with their client laboratories and use the comments in Table 7 as guidelines for discussions on quality issues relating to their data bases.

One highlight issue to comment on is the improvements that several participants have made between successive studies. This is encouraging and may reflect the success of this interlab program and on the constructive in-lab control efforts taken by laboratory managers and analysts.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the participants for the provision of their data, Mr. R. White and Dr. J. Clark of the International Joint Commission Great Lakes Regional Office (Windsor) for their computer programs and valuable assistance as well to Mrs. Karon Miles of the National Water Research Institute for her computer programming that made this study possible.

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8. "Guidelines for In-lab Quality Control for LRTAP Projects", A Report of the Ad-Hoc Work Group on Quality Control to the LRTAP Quality Assurance and Methods Subgroup of the Federal-Provincial Research and Monitoring Co-ordinating Committee. The Guidelines are available from the LRTAP Liaison Office, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario M3H 5T4, Phone 416-667-4803/4885.

List of Previous Interlaboratory Studies

1. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-1: Major Ions, Nutrients and Physical Properties in Water", March 1983.
2. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-2: Trace Metals in Water", March 1983.
3. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-3, Major Ions, Nutrients and Physical Properties in Water", January 1984.
4. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-4, Major Ions, Nutrients and Physical Properties in Water", February 1984.

Copies of these reports are available from:

LRTAP Liaison Office

Atmospheric Environment Service

4905 Dufferin Street

Downsview, Ontario M3H 5T4

Telephone: 416-667-4803/4885.

List of Participants in Study L-6

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U.S. Geological Survey, National Water Quality Lab, Lakewood, Colorado
U.S. Geological Survey, National Water Quality Lab-Atlanta, Doraville, Georgia.

APPENDIX I: LABORATORY DATA

CONTENTS OF APPENDIX I

<u>Parameter</u>		<u>Page Number</u>
Ca	- Calcium	1
Mg	- Magnesium	5
Na	- Sodium	9
K	- Potassium	13
Cl	- Chloride (IC, non IC, combined)	17
SO ₄	- Sulphate (IC, non IC, combined)	26
Acid	- Acidity	34
Alka	- Alkalinity	36
pH	- pH	41
Spec Con	- Specific Conductivity	44
Col	- Colour	48
Si	- Reactive Silica	50
NO ₂ +NO ₃	- (Nitrate + Nitrite)	52

PARAMETER: 20091 CALCIUM

MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.5000 BASIC ACCEPTABLE ERROR=.1500 CONCENTRATION ERROR INCREMENT=.0000
LABORATORIES LEFT TO REPORT: L001,L017,L043,L051,L054,L056
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1	2	3	5	6	7
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
RANK	RANK	RANK	RANK	RANK	RANK	RANK
L0003	71	1.78	32	97	51	3
L0004	60		22	1.0	1.51	29.00
L0005	65	1.8	23	9	1.5	12.00
L0006	73		26	1.01	1.42	25.00
L0009	70		1	1.0	1.5	11.00
L0110	70		16	90	1.4	12
L0111	71		36	96	1.49	8.50
L0113	78		20	1.97	1.45	19.00
L0114	78		39	95	1.56	18.00
L0116	66		22	93	1.46	23.00
L0119	69	1.73	23	93	1.46	17.50
L0120	67	1.86	26	85	1.37	1
L0201	61	1.64	2	1.0	1.30	4.50
L0202	72		3	90	1.5	25.00
L0203	65		21	89	1.42	26.00
L0204	52		26	99	1.42	12.00
L0205	62		20	96	1.44	13
L0207	80	1.60	2	96	1.44	20.50
L0209	68	1.79	22	94	1.44	15.00
L0301A	11		26	1.29	1.78	16.00
L0302	975		2	53	1.78	13.00
L0323	2	1.45	3	82	1.45	11.00
L0403	54	1.77	9	1.00	1.53	1.50
L0405	90	1.76	26	83	1.53	31.00
L0408	99	1.95	24	93	1.44	14.00
L0409	77	1.77	33	1.08	1.5	9.00
L0503	69	1.71	23	93	1.5	29.00
L0507	67	1.75	23	95	1.44	23.00
L0508	66	1.82	20	1.04	1.44	16.00
L0601	74		38	1.00	1.60	14.00
L0602				1.00	1.54	12.50
L0603	43	1.7		1.00	1.54	34.00
L0604	72	1.66	1	1.00	1.54	32.00
L0606	582	1.83	2.21	1.08	1.40	8.50
L0608				1.0	1.5	32.00
L0610				1.0221	1.72	25.00
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PARAMETER: 20091-CALCIUM

MG/L

SAMPLE LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	32	23.00	13.4	28.50	42.5	21.00
L003	25	6.50	13.0	19.50	42.0	12.00
L004	3	15.00	13.0	19.50	41.8	10.00
L006	24	14.00	12.41	8.00	47.30 VH	34.00
L009	33	14.50	11.9 L	3.00	37.8 L	1.00
L010	30	15.00	12.6	14.50	41.6	9.50
L011	32	15.00	12.8	14.50	42.4	19.50
L013	31	19.00	12.8	14.50	42.1	14.50
L014	49	14.00	12.26	14.50	42.2	17.00
L016	29	21.00	13.8	25.00	50.69 VH	35.50
L019	25	21.00	13.7	32.00	43.1	14.50
L020	25	26.50	11.2 VL	11.50	38.4 L	12.00
L022	35	6.50	11.2 H	2.00	47.4 H	33.00
L023	31	28.50	13.36	33.50	42.2	33.50
L024	30	19.00	12.9	27.00	42.2	17.00
L027	30	15.00	12.7	17.00	42.2	22.00
L029	30	15.00	12.5 VH	16.50	42.6	25.00
L031 A	37	10.00	12.5	16.50	43.9	22.00
L032	47.8 H	35.00	12.8	22.50	42.9	26.50
L033	1	35.00	12.8 L	22.50	42.0	22.00
L042	25	0.00	13.3 L	15.00	42.1	12.00
L045	35	31.00	13.39	25.00	44.19	31.00
L046	32	31.00	13.2	25.00	39.6	15.00
L048	33	33.00	12.0 L	5.00	40.9	15.00
L049	4	33.00	12.0	7.00	40.9	15.00
L053	31	19.00	13.6	30.50	42.7	12.00
L057	28	10.00	13.46	28.50	41.3	23.50
L058	35	11.50	12.6 H	28.50	39.3	8.00
L060	315	28.50	14.2	34.00	46.6 H	32.00
L061	27	21.00	13.13 VL	0.00	44.0	0.00
L062	27	9.00	12.6	19.50	43.0	29.50
L064	346	26.00	13.6	15.00	38.7 L	26.50
L066	310	27.00	13.00	30.50	40.7	6.00
MEAN					42.200	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD COJING
L002	223.00	24.667	9		AAS
L003	123.00	15.375	8		FLAME AA
L004	145.00	18.222	9		20103L
L006	149.50	18.688	8	VH	FLAME-AA
L009	145.00	18.125	8	LL	
L010	93.00	11.625	8	L	ICAP-EXTRACT
L011	150.50	20.063	8		AA
L013	174.50	24.750	8		FLAME AA
L014	196.50	24.563	8	VH	AAS
L016	172.50	19.167	9	VH	CHROMAT. IONIQUE
L019	136.50	15.611	9	H	ICP
L020	124.50	15.563	8		AA
L021	140.00	17.444	8	LLVLL	ICP
L022	244.00	30.500	8	VHHH	FLAME-AAS
L023	152.00	19.000	8	VH	FLAME-AAS
L026	188.00	23.500	8		FLAME-AAS
L027	150.00	18.750	8		FLAME-AAS
L029	111.00	13.875	9	LL	
L030	172.00	19.000	8	VH	ICAP
L031A	136.50	17.063	8	VHVVHH	FLAME-AA
L032	234.50	29.313	8	VHVVHVVLL	AUTOM AA
L033	102.00	12.750	8	VL	FLAME A.A.
L042	95.00	10.556	9		ICP
L045	213.00	23.667	9		FLAME-AA
L048	119.00	13.278	9		FLAME-AA
L049	171.00	19.444	9		FLAME-AA
L053	175.00	23.444	9		FLAME-AA
L057	211.00	23.444	9		FLAME-AA
L058	144.50	16.056	9		FLAME A.A.
L060	100.00	11.111	9	HHHH	FLAME-AA
L061	276.50	30.722	9		ICAP
L062	81.00	9.000	3		FLAME-AA
L063	116.50	12.944	9	VL	FLAME-AA
L064	64.50	7.944	9	VLLVLL	AA
L066	150.00	17.167	9	VLL	ICP (PLASMA)
L066	168.00	18.667	9	VLVH	FLAME-AA
OVERALL AVERAGE RANK IS		17.634			

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING	
					BIASED LOW	BIASED HIGH
L021	40.00	4.44	9	VLVL	AA	
L063	71.50	7.94	9	VLVLVL	AAS	
L042	88.00	10.00	8	VL	FLAME-AAS	
L058	100.00	11.11	9		FLAME-AA	
L010	93.00	11.67	8	L	ICAP-EXTRACT	
L027	111.00	12.33	9	LL	FLAME-AAS	
L062	116.50	12.94	9	VL	AA TO AA	
L033	105.00	13.25	8	VHVLVHVL	AA-FLAME	
L046	119.50	13.28	9		FLAME AA	
L003	123.00	15.37	8		ICP	
L020	124.00	15.50	8			
L057	144.50	16.06	9			
L004	146.00	16.22	9			
L031A	136.50	17.06	8	VL	2U103L	
L064	160.00	17.78	9	VLL	ICAP	
L009	145.00	18.12	8	LL	ICP (PLASMA)	
L066	168.00	18.67	9	VLVH	FLAME-AA	
L006	149.50	18.68	8	VH	FLAME-AA	
L025	170.00	18.75	9	VH	FLAME-AAS	
L016	172.50	19.17	9	VH	AAS	
L049	175.00	19.44	9	VH	FLAME-AAS	
L023	175.00	19.50	8	VH		
L029	177.00	19.88	9	VH		
L011	170.50	20.03	8	H	CHROMAT. IONIQUE	
L013	174.00	21.75	8		AA	
L053	211.00	23.88	9	VH	FLAME A.A.	
L045	225.00	23.75	9		ICP	
L014	232.50	24.26	8		FLAME AA	
L002	252.00	27.00	9		AAS	
L061	31.00	27.00	3	VHVVHVVH	FLAME-AA	
L032	234.50	29.31	8	VHHH	FLAME AA	
L022	244.00	30.50	8	HHH	ICP	
L060	276.50	30.72	9		ICAP	
OVERALL AVERAGE RANK IS		17.634			INSUFFICIENT DATA	
					BIASED HIGH	
					BIASED HIGH	
					BIASED HIGH	

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= .0500 CONCENTRATION ERROR INCREMENT= .1000
LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK	RANK	RANK	RANK
L002	.43	.45	.43	.20	.39	.77
L003	.44		.47	.22	.32	.76
L004	.49	.5	.52	.24	.37	.74
L009	.42		.47	.20	.32	.52
L010	.40		.44	.20	.32	.52
L011	.43		.48	.22	.33	.53
L012	.42		.51	.22	.33	.53
L016	.45		.51	.21	.34	.55
L019	.45	.46	.48	.19	.32	.78
L020	.51	.49	.51	.21	.33	.79
L022	.54	.39	.51	.18	.33	.79
L023	.54		.41	.20	.32	.74
L024	.46		.50	.25	.36	.88
L027	.41		.47	.20	.35	.88
L029	.44		.50	.22	.34	.74
L031A	.43		.46	.20	.34	.85
L033	.49		.49	.23	.32	.86
L034	.41		.47	.15	.38	.73
L042	.38		.47	.19	.32	.65
L045	.42		.46	.23	.35	.80
L048	.39		.43	.16	.32	.74
L049	.4		.41	.16	.34	.73
L053	.42		.44	.22	.34	.68
L057	.42		.44	.22	.34	.73
L060	.43		.46	.21	.33	.73
L061	.50		.56	.24	.37	.93
L062	.4		.5	.21	.37	.81
L063	.44		.49	.22	.34	.75
L064	.49		.51	.22	.36	.78
L066	.447		.501	.20	.36	.73
MEAN	.430	.460	.487	.210	.330	.760
STDEV						

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LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L048	38.00	4.223	9	LL	FLAME-AAS
L010	60.50	7.563	8	VL	ICAP-EXTRACT
L057	71.50	8.056	9		AA-FLAME
L046	72.50	8.056	9		AUTO AA
L033	40.00	10.000	4	VHLL	FLAME AA
L014	83.50	10.438	8	L	FLAME A.A.
L042	105.50	11.722	9		FLAME AAS
L024	196.00	12.000	8	VLH	AA
L021	111.50	12.389	9	LVL	
L020	111.00	12.500	8	VHVV	ICP
L009	112.50	13.875	8		12102L
L004	127.50	14.063	8		AAS
L063	135.50	15.167	9	L	AAS
L016	139.00	15.444	9		FLAME-AAA
L002	141.50	15.722	9	VL	FLAME-AA
L053	144.50	16.056	9		FLAME-AAS
L049	148.50	16.500	9		ICAP
L031A	154.00	18.613	8		FLAME AA
L032	157.50	19.474	8	H	FLAME-AAS
L025	160.50	20.063	8		FLAME-AA
L021	161.00	20.125	8	H	FLAME-AA
L027	170.00	21.250	8	H	FLAME-AA
L003	174.50	22.813	8		AA
L053	198.00	24.000	9	VLVH	FLAME A.A.
L023	185.50	23.168	8		FLAME-AAS
L019	203.50	25.278	9	H	CHROMAT. IONIQUE
L082	212.00	26.356	9		ICP (PLASMA)
L064	235.50	29.056	9		ICP
L045	237.00	29.333	9	VHVVH	ICP
L022	230.50	28.813	8	VHVVHVVH	ICAP
L060	266.00	29.556	3	HHH	FLAME-AA
L006	259.00	32.375	8		
OVERALL AVERAGE		17.445			
RANK IS					

LAB NO. TOTAL RANK SUMMARY OF RANKING

METHOD CODING

LAB NO.	TOTAL RANK	AVERAGE RANK	NO OF SAMPLES RANKED	SUMMARY OF RANKING	METHOD CODING
L002	139.00	15.444	9		AAS
L003	170.50	21.250	8	H	FLAME AA
L004	127.50	14.675	9	HHH	ICP
L006	259.00	32.375	8		FLAME-AA
L009	112.50	14.063	8	VL	ICAP-EXTRACT
L010	50.50	7.563	8		
L011	108.00	13.500	8		AA
L012	174.50	21.813	8	L	FLAME AA
L013	183.50	22.938	8		AAS
L016	139.00	15.444	9		CHROMAT. IONIQUE
L019	203.50	22.611	9		ICP
L020	111.00	13.875	8	VHVH	AA
L021	111.00	13.875	8	VHV HHVH	ICP
L022	230.50	28.813	8	VHVH	FLAME-AA
L023	135.00	16.875	8	VLH	FLAME-AAS
L024	130.00	16.250	8		FLAME-AAS
L025	190.00	23.750	8	H	
L026	157.00	19.625	9		ICAP
L029	133.50	15.938	8	H	FLAME AA
L031	140.50	17.563	8	VHVL	AUTO AA
L032	133.50	16.688	8		FLAME A.A.
L033	137.00	17.125	9		ICP
L042	105.50	13.188	9		AA-FLAME
L045	137.00	15.222	9	LL	FLAME-AAS
L046	72.50	8.056	9		FLAME-AAS
L049	148.50	16.500	9		FLAME A.A.
L053	198.00	22.000	9		
L057	171.50	19.944	9		FLAME-AA
L058	141.50	17.722	9	VHVHVVHVH	ICAP
L060	266.00	29.556	9		FLAME-AA
L061	61.00	7.625	3	H	ICAP
L062	212.00	20.333	9	H	FLAME-AA
L063	135.50	15.056	9	L	AAS
L064	225.50	25.056	9	H	ICP(PLEASMA)
L066	144.50	16.056	9	VL	FLAME-AA
OVERALL AVERAGE		17.445			
RANK IS					

84/03/27

PARAMETER: 11091 SODIUM

MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. 15: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .5000 BASIC ACCEPTABLE ERROR= .2000 CONCENTRATION ERROR INCREMENT= .1400
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1			2			3			5			6			7		
	REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK	
L002	3.12	15.00		2.33	9.00		1.94	8.50		1.9	8.50		2.7	6.00		4.02	14.00	
L003	3.2	22.00		1.0	0.00		1.0	21.50		1.3	30.00		4.1	31.50		18.01	18.00	
L004	3.2	4.00		2.2	1.00		1.9	2.50		2.3	22.50		3.0	11.50		3.66	1.00	
L006	3.12	15.00		2.28	4.00		1.91	5.00		2.1	22.50		3.1	20.50		3.76	4.00	
L009	3.19	4.00			0.00		1.93	7.00		2.0	16.50		3.0	13.50		3.8	3.00	
L010	3.0	8.50			0.00		1.0	21.50		2.0	26.50		3.0	12.50		4.0	10.50	
L011	3.15	19.50			0.00		1.02	26.00		2.6	26.50		3.4	25.50		4.10	18.00	
L013	3.32	26.00			0.00		1.98	16.50		1.9	8.50		2.9	8.00		4.15	21.00	
L014	3.29	27.00			0.00		1.00	21.50		1.4 H	33.50		4.8	33.50		3.94	26.50	
L016	3.29	6.00		2.23	3.00		1.94	8.50		2.2	33.00		2.9	20.50		3.68	18.00	
L019	3.23	25.00			16.00		1.97	12.50		2.1	16.00		3.1	20.50		4.1	35.50	
L020	3.14	29.00			10.00		1.19	33.00		2.6	26.50		3.8	29.00		4.2	32.00	
L021	3.48	31.00		2.65	19.00		1.0	21.50		0.1	0.00		3.8	29.00		4.20	35.50	
L022	3.2	27.00			0.00		1.90	22.50		2.0	30.00		3.7	27.00		4.2	32.00	
L023	3.36	27.00			0.00		1.00	21.50		2.5	30.00		3.7	27.00		4.2	32.00	
L024	3.15	19.50			0.00		1.99	18.00		2.5	30.00		3.7	27.00		4.2	32.00	
L025	3.15	19.50			0.00		1.00	21.50		2.5	30.00		3.7	27.00		4.2	32.00	
L027	3.05	10.00		2.35	10.00		1.00	21.50		2.5	30.00		3.7	27.00		4.2	32.00	
L028	3.23	27.00		2.41	13.00		1.0	19.50		2.9	30.00		3.7	27.00		4.2	32.00	
L029	3.13	11.00			0.00		1.97	12.50		3.0	30.00		3.7	27.00		4.2	32.00	
L030	3.08	11.00			0.00		1.97	12.50		3.0	30.00		3.7	27.00		4.2	32.00	
L031	3.49	31.00			23.00		1.90	16.50		2.47	25.00		3.76	28.00		4.25	35.00	
L032	3.3	28.00		3.29	23.00		1.0	21.50		1.0	0.00		3.76	28.00		4.25	35.00	
L033	3.3	12.50		2.36	5.00		1.02	26.00		1.5	5.00		3.76	28.00		4.25	35.00	
L034	3.16	13.50		2.36	5.00		1.95	10.00		1.5	5.00		3.76	28.00		4.25	35.00	
L035	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L036	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L037	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L038	3.12	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L039	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L040	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L041	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L042	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L043	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L044	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L045	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L046	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L047	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L048	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L049	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L050	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L051	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L052	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L053	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L054	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L055	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L056	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L057	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L058	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L059	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L060	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L061	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L062	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L063	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L064	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L065	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
L066	3.05	13.50		2.36	5.00		1.11	10.00		1.7	6.00		3.76	28.00		4.25	35.00	
MEAN	3.130			2.380			1.985			2.12			3.03			4.100		
SD																		

84/03/27

PARAMETER 10911 SODIUM

MG/L

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SAMPLE LAB NO	8		9		10	
	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	.48	8.50	1.22	11.50	17.5	3.00
L003	.5	32.50	1.3	21.50	19.1	15.00
L004	.4	22.50	1.1	16.00	18.1	17.00
L006	.50	22.50	1.25	16.00	20.38	31.00
L009	.5	13.50	1.1	8.00	17.8	12.50
L010	.51	18.00	1.26	18.00	19.0	15.00
L011	.52	18.00	1.24	14.00	18.7	10.00
L014	.53	30.00	1.109	13.00	18.7	10.00
L016	.54	30.00	1.109	11.00	19.80	28.00
L019	.54	22.50	1.25	16.00	19.2	16.50
L020	.54	22.50	1.25	31.00	19.2	19.00
L022	.54	20.50	1.35	33.00	19.5	22.50
L023	.61	32.00	1.2	21.50	21.	33.50
L024	.5800	27.00	1.34	8.00	18.3	6.00
L025	.45	25.50	1.35	26.00	19.2	21.00
L027	.58	5.50	1.2	28.00	19.2	12.50
L029	.58	13.50	1.19	5.00	18.7	10.00
L031A	.504	8.50	1.27	19.00	19.5	24.50
L033	1.4	17.00	1.18 VH	4.00	19.1	17.00
L042	.43	10.00	1.32	35.00	20.8	32.00
L045	.45	5.50	1.27	25.00	19.0	15.00
L046	.47	34.00	1.37	8.00	19.2	19.00
L048	.53	22.50	1.31	29.00	19.5	22.50
L049	.5	13.50	1.4	24.00	21.	33.50
L053	.50 VH	13.50	1.25	31.00	18.5	8.00
L057	1.27	35.00	1.92 VH	16.00	19.7	26.50
L058	.55	28.50	1.34	34.00	19.6	24.50
L060	.55	25.50	1.40	26.50	22.8 H	35.00
L061	.56 VL	25.50	1.40	31.00	22.8 H	35.00
L062	.5	13.50	1.3	0.00	20.	0.00
L063	.54	17.00	1.3	21.50	20.	29.50
L064	.53	22.50	1.3	21.50	17.4	1.00
L065	.5200	19.50	1.22	21.50	17.5	4.00
MEAN			1.260	11.50		
CONC.	.5100			19.200		

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LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L002	84.00	9.373	9		FES
L003	191.00	22.778	8		FLAME AE
L004	125.00	16.723	9		1110SL
L005	172.50	19.063	9		FLAME-AA
L006	100.50	12.567	8		ICAP-EXTRACT
L007	155.50	18.177	8		IC
L008	134.50	15.473	8		FLAME AA
L009	150.50	18.973	8		AAS
L010	173.00	19.222	9		IC
L011	227.00	25.225	8		FLAME-PHOTO
L012	135.50	16.288	7		IC
L013	123.50	14.188	8		FLAME-AA
L014	193.50	22.438	8		FLAME-AAS
L015	187.50	21.278	8		FLAME-AAS
L016	155.50	18.389	9		FLAME-AAS
L017	111.50	12.389	9		ICAP
L018	124.00	15.200	8		FLAME AA
L019	105.50	12.178	8		AUTO FLAME
L020	178.00	18.667	9		FLAME-AA
L021	265.50	29.500	9		AA FLAME
L022	152.00	17.556	9		FLAME-AA
L023	203.00	22.556	9		AA FLAME
L024	116.00	12.889	9		FLAME-AA
L025	283.50	31.500	9		FLAME-AA
L026	226.50	25.167	9		FLAME-AA
L027	244.00	27.111	9		FLAME-AA
L028	39.50	4.389	3		AA
L029	146.00	16.222	3		FLAME-AA
L030	166.00	18.333	3		AA
L031	183.50	20.389	3		AAS
L032	105.50	11.722	3		IC
L033					DIONEX MODEL 10
L034					FLAME-AA
L035					
L036					
L037					
L038					
L039					
L040					
L041					
L042					
L043					
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OVERALL AVERAGE RANK IS	17.410				

LAB NO.	TOTAL RANK	AVERAGE RANK	NO OF SAMPLES RANKED	SUMMARY OF FLUCCING	METHOD CODING	
					BIASED LOW	BIASED LOW
L004	25.00	2.778	9		1105L	1105L
L027	66.00	7.278	9		FLAME-AAS	FLAME-AAS
L063	77.333	8.667	9		AAS	AAS
L045	80.00	8.889	9		FLAME-AA	FLAME-AA
L016	82.50	9.167	9		AAS	AAS
L009	84.00	9.333	9		FES	FES
L002	105.50	11.722	9	L	FLAME-AA	FLAME-AA
L066	111.50	12.389	9		ICAP-EXTRACT	ICAP-EXTRACT
L029	110.50	12.278	9		FLAME-A.A.	FLAME-A.A.
L010	116.00	12.889	9	VL	FLAME-AA	FLAME-AA
L053	139.50	15.500	9		IC	IC
L061	139.50	15.500	9		ICAP	ICAP
L005	123.50	13.722	9		FLAME AA	FLAME AA
L013	123.50	13.722	9		FLAME A.A.	FLAME A.A.
L031A	125.00	13.889	9	L	FLAME-AAS	FLAME-AAS
L025	142.50	15.833	9		AA	AA
L022	166.00	18.444	9		FLAME-EMM	FLAME-EMM
L048	166.00	18.444	9		IC	IC
L020	173.00	19.222	9		FLAME-AA	FLAME-AA
L022	173.00	19.222	9	H	FLAME-AA	FLAME-AA
L064	173.00	19.222	9		IC DIONEX MODEL 10	IC DIONEX MODEL 10
L011	183.00	20.333	9		AUTO FLAME	AUTO FLAME
L049	183.00	20.333	9	HVH VH	FLAME-AAS	FLAME-AAS
L025	183.00	20.333	9		FLAME-AAS	FLAME-AAS
L003	187.00	20.778	9		FLAME-AAS	FLAME-AAS
L024	191.00	21.222	9		FLAME-AA	FLAME-AA
L058	226.50	25.167	9	HH	FLAME-AA	FLAME-AA
L060	226.50	25.167	9		AA	AA
L021	234.50	26.056	9		FLAME-PHOTO	FLAME-PHOTO
L020	237.00	26.333	9		AA-FLAME	AA-FLAME
L046	265.50	29.500	9	H		
L057	283.50	31.500	9	VHV HV HV HV HV HV		
OVERALL AVERAGE		17.410				
RANK IS						

84/03/27

PARAMETER: 19091 POTASSIUM

MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .2000 BASIC ACCEPTABLE ERROR= .0500 CONCENTRATION ERROR INCREMENT= .1600
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1			2			3			5			6			7		
	REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK	
L002	.28	19.00		.16	8.00		.16	15.50		.11	12.50		.13	10.00		2.36	13.00	
L003	.3	25.50			0.00		.2	27.00		.1	8.00		.2	28.00		2.4	17.50	
L004	.2 L	3.50		.1 L	3.00		.1 L	5.00		.1	8.00		.1	5.50		2.2	3.00	
L006	.17 VL	2.00		.09 VL	2.00		.15	12.50		.07	2.50		.08 L	2.00		2.21	5.00	
L009	.28	19.00			0.00		.15	12.50		.12	17.50		.15	18.00		2.3	8.50	
L010	.24	6.50			0.00		.13	29.50		.17	29.50		.14	12.50		2.24	20.00	
L011	.32	28.50		.23	0.00		.19	29.00		.29 VH	33.00		.24 VH	31.00		2.24	22.00	H
L013	.30	28.50			0.00		.19	29.00		.11	12.50		.14	11.00		2.26	26.00	
L014	.25	8.50			0.00		.08 VL	21.00		.08	12.50		.06 VL	11.00		2.25	21.50	
L016	.32	28.50		.17	10.00		.17	29.00		.13	23.00		.15	23.00		2.3	17.50	
L019	.34	26.50		.15	17.00		.14	29.50		.11	12.50		.15	18.00		2.32	17.50	
L020	.29	22.50		.18	15.00		.18	23.50		.14	25.50		.17	25.50		2.27	31.00	
L021	.29	22.50			0.00		.16	29.00		.17	29.50		.17	29.50		2.27	31.00	
L022	.25	8.50			0.00		.16	12.50		.17	29.50		.17	29.50		2.27	31.00	
L023	.22	5.00			0.00		.16	12.50		.17	29.50		.17	29.50		2.27	31.00	
L025	.27	14.50			0.00		.26	37.50		.15	22.50		.15	22.50		2.26	28.00	
L027	.26	11.00		.12	4.00		.14	32.50		.12	17.50		.12	17.50		2.28	29.00	
L029	.27	14.50		.17	10.00		.15	15.50		.12	17.50		.15	18.00		2.29	19.00	
L030 A	.27	14.50			0.00		.15	15.50		.12	17.50		.15	18.00		2.29	19.00	
L032	.378 VH	33.00			0.00		.233 H	38.00		.161	28.00		.225 H	30.00		2.28	25.00	
L033	.29	33.00		.24	0.00		.24	38.00		.161	28.00		.225 H	30.00		2.28	25.00	
L042	.29	33.00		.18	15.00		.17	21.00		.11	12.50		.12	8.00		2.27	30.00	
L043	.28	22.50		.14	5.50		.14	19.50		.10	8.00		.12	8.00		2.29	15.00	
L046	.29	19.00		.13	15.00		.16	15.50		.10	8.00		.12	8.00		2.29	15.00	
L049	.272 VH	16.00		.173	12.00		.169	19.50		.12	14.50		.151	18.00		2.26	23.50	
L053	1.47 VH	34.00		.34 VH	21.00		.34 VH	33.00		.39 VH	34.00		.39 VH	33.00		2.32	11.50	
L057	.28 VH	19.00		.18	15.00		.17	33.00		.12	17.50		.15	18.00		2.24	15.50	
L058	.30	31.00		.2	15.50		.2	27.00		.2 VH	25.50		.2	18.00		2.2	23.50	
L060	.41 VH	32.50		.18	15.00		.18	27.00		.14	25.50		.15	25.50		2.3	27.00	
L061	.25 L	0.00		.27 VH	20.00		.26 VH	31.50		.22 VH	25.50		.25 VH	32.00		3.50 VH	33.00	
L062	.25	3.50		.2	0.00		.2	0.00		.125	21.50		.518 VH	34.00		2.4	0.00	
L063	.13 VL	1.00		.14	18.50		.13	27.00		.1	8.00		.2	34.00		2.2	17.50	
L064	.13 VL	1.00		.055 VL	5.50		.095 L	7.00		.15	27.00		.098 L	12.50		3.8 VH	34.00	
L066	.261	13.00		.170	10.00		.166	3.00		-.005 VL	4.00		.144	4.00		2.45	34.00	
MEDIAN	.280			.170			.160			.120			.150			2.400		
CON.																		

84/03/27

PARAMETER: 130911 POTASSIUM

MG/L

SAMPLE LAB NO	8		9		10	
	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	.34	25.50	.48	10.50	1.10 H	30.50
L003	.35	29.00	.5	18.00		18.50
L004	.37	9.00	.4 L	4.00	.76	7.50
L006	.21 VL	1.00	.41	4.00	.81	7.50
L010	.20	21.00	.50	18.00	.81	13.00
L011	.18	27.00	.43 H	32.00	1.49 VH	33.00
L013	.25	27.00	.51	22.50	.31	23.00
L014	.23	3.50	.43	5.00	.86	10.00
L016	.23	23.00	.53	29.00	.93	26.00
L019	.29	3.50	.49	13.00	.79	3.00
L020	.3	9.00	.5	18.00	.9	18.50
L021	.15	27.50	.54	30.50	.83	8.00
L022	0.8	0.00	.52	0.00	.4 VL	1.00
L023	.43 VH	33.00	.48	27.00	.90	18.50
L024	.31	15.00	.48	10.50	.93	26.00
L025	.36 01	29.00	.250 VL	1.00	1.10 H	30.50
L027	.30	9.00	.46	7.50	.42	7.00
L029	.32	17.00	.49	13.00	.85	9.00
L031A	.30	19.00	.50	18.00	.90	18.50
L032	.177	31.00	.511	24.00	.871	11.00
L033	.34	9.00	.5	18.00	.9	18.50
L042	.34	25.00	.52	27.00	.33	26.00
L045	.31	15.00	.49	13.00	.92	24.00
L046	.32	17.50	.51	22.50	.96	29.00
L048	.324	19.00	.476	9.00	.89	14.00
L049	.33	33.00	.91 VH	34.00	2.24 VH	34.00
L053	.33	21.00	.52	27.00	.90	18.50
L057	.33	21.00	.5	18.00	.8	14.50
L058	.33	21.00	.54	30.50	.35	28.00
L061	.335	35.00	.74 VH	33.00	1.30 VH	32.00
L062	.31	23.00	.5	18.00	.9	18.50
L063	.31	15.00	.46	7.50	.30	18.50
L064	.339	24.00	.517	25.00	2.37 V4	33.00
MEDIAN	.320		.500		.879	12.00
CONC.					.300	

LAB NO.	QUANTITY OF FLUORESCENT DYE	NO. OF SAMPLES RANKED	AVERAGE RANK	REMARKS	METHOD	COATING
L003	14.30	9	16.938	H	FES	FLAME AE
L004	14.30	8	18.944	LLLL	FLAME	FLAME
L006	13.50	8	12.970	VLVLLVL	FLAME	FLAME-AA
L009	13.50	8	12.375			
L010	23.00	8	11.313	HVHVHVHVHV	FLAME	FLAME-ATOMIC-EMISS
L011	17.40	8	11.813	VLVL	IC	FLAME-AA
L013	15.20	8	16.938		CHROMAT.	IONIQUE
L016	19.70	9	11.344	L	FLAME-CHROMAT.	IONIQUE
L019	34.50	8	13.389		FLAME-CHROMAT.	IONIQUE
L020	10.70	8	13.375	VL	IC	FLAME-AA
L021	10.70	8	13.000	VH	FLAME-AA	FLAME-AA
L023	17.30	8	21.688	VH	FLAME-AA	FLAME-AA
L024	19.50	8	12.875	VLVH	FLAME-AA	FLAME-AA
L025	19.50	8	12.875	VLVH	FLAME-AA	FLAME-AA
L027	12.10	9	13.444	VHHH	ICAP	FLAME-AA
L031A	12.40	8	15.500	VH	FLAME-AA	FLAME-AA
L032	18.50	8	12.300		FLAME-AA	FLAME-AA
L033	18.10	8	12.833		FLAME-AA	FLAME-AA
L042	18.70	9	13.000		FLAME-AA	FLAME-AA
L045	17.70	9	13.722		FLAME-AA	FLAME-AA
L046	17.70	9	13.722		FLAME-AA	FLAME-AA
L049	14.20	9	12.389	VHVHVHVHVHVHVHVHV	BIASED	BIASED-HIGH
L053	19.10	9	12.056	VHVH	BIASED	BIASED-HIGH
L057	17.50	9	12.500	VHVH	BIASED	BIASED-HIGH
L058	22.10	9	12.556	VHVHVHVHVHVHVHVHV	BIASED	BIASED-HIGH
L060	28.00	9	13.167	VH	BIASED	BIASED-HIGH
L061	14.80	3	11.444	L	BIASED	BIASED-HIGH
L062	10.70	3	11.889	VLVLLLVHLLVH	BIASED	BIASED-HIGH
L064	86.00	9	9.556	VL	BIASED	BIASED-HIGH
L066	139.50	9	15.500		BIASED	BIASED-HIGH
OVERALL AVERAGE			17.159			
RANK IS						

LAB NO.	LAB RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	BIASED LOW INSUFFICIENT DATA BIASED LOW BIASED LOW	METHOD CODING
L006	23.50	2.500	9	VLVLLVL		FLAME-AA
L002	23.50	4.974	9	LLL		FLAME-AA
L004	43.50	8.389	9	VLVL		FLAME-AA
L014	52.50	9.389	9	VLVLLLVHLLVH		CHROMAT-X IONIQUE 10
L064	83.50	9.389	9	VLVLLLVHLLVH		ICADIONE-X MODEL 10
L027	87.50	9.722	9	LL		FLAME-AAS
L024	95.50	11.875	9			FLAME-AAS
L063	107.50	11.875	9			AAS
L010	133.50	13.375	9			FLAME ATOMIC-EMISS
L045	117.50	13.375	9	L		FLAME-AA
L020	107.50	13.444	9			FLAME-PHOTO
L029	121.50	13.444	9			ICAP
L031A	124.50	15.500	9	VL		FLAME-AA
L066	139.50	15.500	9			
L009	127.50	15.938	9	H		FES
L002	144.50	16.056	9			FLAME-EMH
L043	145.50	16.167	9	VH		AUTO FLAME
L033	141.50	16.300	5	L	INSUFFICIENT DATA	AA
L062	148.50	16.444	9	VH		FLAME AE
L007	151.50	16.938	9	VH		
L057	175.50	19.500	9	VH		AA-FLAME
L066	177.50	19.722	9			FLAME A-A.
L053	189.50	20.056	9			FLAME A-A.
L042	173.50	21.688	9			FLAME-AAS
L013	174.50	21.813	9			IC
L016	197.50	22.833	9	VHVLH		AAS(IE)
L031	183.50	23.000	9	VH		FLAME-AAS
L032	207.50	23.125	9	VH		IC
L052	205.50	23.125	9	VH		FLAME-AA
L058	221.50	23.529	9	VH		FLAME-AA
L061	208.50	26.167	9	VHVVHVVHVVHVVHVVH	INSUFFICIENT DATA	FLAME-AA
L060	200.50	31.167	9	VHVVHVVH	BIASED HIGH	AA
L011	250.50	31.313	9	VHVVHVVHVVHVVHVVH	BIASED HIGH	FLAME-AA
L049	231.50	32.389	9	VHVVHVVHVVHVVHVVH	BIASED HIGH	FLAME-AAS
OVERALL AVERAGE RANK IS		17.159				

84/03/27

PARAMETER: 17000 CHLORIDE IC

MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= .2500 CONCENTRATION ERROR INCREMENT= .1500
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK	RANK	RANK	RANK
L003	4.3	3.50	5.00	5.00	1.00	1.00
L007	6.98	0.00	18.00	16.50	12.00	17.00
L013	5.40	0.00	14.50	18.50	12.50	10.00
L019	5.00	0.00	4.50	1.00	10.00	17.00
L020	3.37	3.2	1.25	6.3	17.50	2.00
L021	6.05	3.50	16.00	17.00	16.00	11.00
L0225	5.05	0.00	18.00	11.00	14.00	3.00
L028	15.22	7.8 VH	27.00	1.31 VH	4.8 VH	4.00
L032	4.9	3.11	1.564	2.2 VH	2.8 VH	15.50
L048	3.74	2.90	9.50	6.7	11.00	14.00
L050	3.74	3.00	14.00	6.0	2.50	19.00
L058	5.07	3.26	9.50	8.1	2.50	8.50
L061	6.6 VH	0.00	3.00	8.5	5.50	15.00
L063	5.24	3.7	0.00	6.5	13.00	13.00
L064	4.8	3.41	11.00	1.0	19.00	0.00
L066	5.01	3.16	16.00	7.3	16.00	18.00
MEDIAN			12.00	7.1	9.00	12.00
CONC.	5.105	3.200	.270	.635	.905	6.895

SAMPLE LAB NO	8	9	10
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK
L003	1.3	1.2	93
L007	1.50	1.25	123.4 H
L013	1.49	1.30	105.5
L014	1.50	1.20	125.5 H
L019	1.54	1.20	111.1
L020	1.60	1.31	104.0
L021	1.64	1.36	99.8
L022	1.5	1.1	130.0 VH
L025	1.50	1.32	190.0
L028	2.2 VL	4.0 VH	155.0 VH
L029	1.53	1.26	107.0
L032	1.14 L	1.19	101.0
L048	1.43	1.22	106.0
L050	1.45	1.32	104.0
L054	1.44	1.23	116.0
L061	1.57	1.4	137.5 VH
L062	1.54	1.39	100.5
L063	1.62	1.4	110.0
L066	1.7	1.26	99.9
MEDIAN	1.43		105.750
CONC.	1.500	1.260	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	BIASED LOW	METHOD CODING
L003	38.00	4.750	8	HHH		DIONEX
L007	110.50	13.813	8	LH		IC
L013	10.00	1.250	8			I.C.
L014	74.00	9.250	8			CHROMAT. IONIQUE
L019	70.50	8.833	9			DIONEX, I.C.
L020	100.50	12.563	8			
L021	96.50	10.813	9	H		ION CHROMATOGRAPHY
L022	111.00	13.875	8	VHVHVHVH		I.C. CHROM. IC
L025	99.50	12.438	8	VHVHVHVH VLVHVH		WESCAN IC
L028	153.00	17.000	9			
L029	85.50	9.500	9			DIONEX
L032	40.50	5.063	8	L		I.C.
L048	27.50	3.438	9	VH		IC
L050	77.00	9.656	9			I.C.
L054	81.50	9.833	9			IC
L061	68.50	7.611	9			IC
L062	44.50	4.944	9	VHVHVH		IC
L063	126.50	14.056	9			INSUFFICIENT DATA
L064	122.50	13.833	9			
L066	119.00	13.222	9			IC DIONEX MODEL 10
	61.50	7.750	8			ION CHROM
OVERALL AVERAGE RANK IS		10.345				

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	BIASED LOW	METHOD CODING
L003	31.00	4.750	8	L		DIONEX
L032	40.50	5.063	8			DIONEX
L048	57.50	6.389	9			I.C.
L013	50.00	7.500	8			IC
L060	51.50	7.611	9			ION CHROM
L066	51.50	7.688	8			CHROMAT. IONIQUE
L019	70.50	8.833	9	VH		IC
L050	77.00	9.056	9			I.C.
L054	81.50	9.056	9			
L014	74.50	9.250	8	LH		I.C.
L029	95.50	9.500	9	H		DIONEX, I.C.
L021	99.50	10.944	9			IC DIONEX MODEL 10
L025	100.50	12.438	8			
L020	100.50	12.563	8			ION CHROMATOGRAPHY
L063	112.50	13.222	9			IC
L061	112.50	13.611	9			WESCAN IC
L007	110.50	13.813	8	HHH		
L022	111.00	13.875	8	VHVHVHVH		ION CHROMATOGRAPHY
L062	126.50	14.056	9	VHVHVH		IC
L064	122.50	13.833	9			INSUFFICIENT DATA
L028	153.00	17.000	9	VHVHVHVH VLVHVH		BIASED HIGH
OVERALL AVERAGE RANK IS		10.345				

84/0327

PARAMETER: 17001 CHLORIDE NON IC METHODS MS/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= .2500 CONCENTRATION ERROR INCREMENT= .1500
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK	RANK	RANK	RANK
L002	4.8	2.9	1.2	6.5	8	5.5
L004	3.4	3.5	3.8	7.1	21	7.1
L006	4.80		3.6	5.4	16	8.26 H
L009	4.8		3.6	5.4	16	8.26 H
L010	4.79		3.6	5.4	16	8.26 H
L011	5.00		3.6	5.4	16	8.26 H
L016	5.15	3.30	3.6	5.4	16	8.26 H
L020B	5.6		3.6	5.4	16	8.26 H
L023	5.0		3.6	5.4	16	8.26 H
L027	5.0	2.96	3.6	5.4	16	8.26 H
L031A	5.0		3.6	5.4	16	8.26 H
L031B	5.49		3.6	5.4	16	8.26 H
L033	5.50	3.85	3.6	5.4	16	8.26 H
L045	5.2		3.6	5.4	16	8.26 H
L049	5.3	3.6	3.6	5.4	16	8.26 H
L049	5.3	3.6	3.6	5.4	16	8.26 H
L053	5.2	3.4	3.6	5.4	16	8.26 H
L057	5.2	3.5	3.6	5.4	16	8.26 H
L058	5.2	3.5	3.6	5.4	16	8.26 H
L061	5.3	3.8	3.6	5.4	16	8.26 H
L063	5.2	3.4	3.6	5.4	16	8.26 H
MEDIAN	5.000	3.300	3.400	6.70	9.00	6.820

84/03/27

PARAMETERS: 1701 CHLORIDE NON IC METHODS MG/L

SAMPLE LAB NO	8			9			10		
	REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK	
L002	1.3	3.50		1.3	6.50		106.2	17.00	
L004	1.5	11.50		1.23	12.50		113	21.50	
L006	1.5	17.00		1.23	19.00		60.50 VL	3.00	
L009	1.5	11.50		1.3	18.00		104.0	11.00	
L011	1.32	14.00		1.3	18.00		101.05 VL	1.00	
L014	1.25	21.00		1.20	12.50		110.50	20.00	
L016	1.25	16.00		1.2	12.50		104.5	23.00	
L020B	1.9	22.50		2.4 VH	23.00		123. H	9.00	
L023	1.15 V/L	1.00		1.12 VL	3.00		100.	5.00	
L027	1.4	8.00		1.1	3.50		106.	16.00	
L027A	1.46	11.50		1.19	12.50		105.	14.50	
L031B	1.5	25.00		1.3	0.00		99.0	4.00	
L032	7.38 VH	0.00		7.10 VH	24.00		102.	23.00	
L033	1.5	0.00		1.60 H	20.50		126. H	7.50	
L042	1.58	11.50		1.3	12.50		104.	11.00	
L045	1.6	18.50		1.6 H	20.50		113.	21.50	
L046	1.7	22.50		1.3	12.50		102.	7.50	
L048	1.6	18.50		1.1	3.50		105.	14.50	
L049	1.6	11.50		1.4	18.00		104.	11.00	
L053	1.5	11.50		1.9 VL	12.50		38. VL	2.00	
L057	1.9 VL	0.00		1.3	12.50		131. V4	25.00	
L058	1.53	15.00		2.0 VH	22.00		107.	18.00	
L061	1.9 VH	24.00		1.4	18.00		110.	19.00	
L062	1.6	18.50							
MEDIAN	1.580			1.300			104.500		

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L002	67.50	7.500	9		TECHNICON
L004	101.50	12.383	9		17203L
L006	79.50	13.313	8	HVL	AUTO ANALYZER
L009	77.50	9.688	8		THIOCYANATE-COMB.R
L010	52.00	6.375	8	VL	
L011	102.00	12.750	8		COLORIMETRIC
L016	105.00	11.667	9		MERC-THIOBLUE
L020B	117.50	14.625	8	VHVVHVHVVH	AG TITRATION
L023	181.50	22.688	8	LVL VL	AUTO-THIOCYANATE
L024	62.00	7.750	8		COLORIMETRIC
L027	63.00	7.875	9		COLORIMETRIC
L031A	103.50	12.938	8		TITRAGE CONDUCTIV
L031B	152.00	19.000	8		RESINES
L032	126.00	15.750	8	VHVVHVHVVH	AUTO THIOCYANATE
L033	148.00	18.500	8	HVH HH	AUTO SCN
L042	128.50	16.063	9		SPECIFIC ION
L045	193.00	24.125	9	VHV HVHH	MERCURIC THIOCYAN
L046	94.00	11.750	9		AUTOANALYZER
L048	38.00	4.778	8		TECHNICON
L049	135.50	16.938	9	VLVLVLVL	HG (NO3)2 TIT.
L057	88.00	11.000	8	VH	TITRATION
L058	48.00	6.000	8		TECHNICON AA II
L061	178.50	22.313	8	VHVVHVH	TECHNICON ANALYSER
L062	152.00	19.000	9		DESCARIE
L063	152.00	19.000	9		PESCN DISCR.
OVERALL AVERAGE		12.650			

LAB NO.	TOTAL RANK	AVERAGE RANK	NO OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L057	34.00	4.250	8	VLVLVLVL	AUTO SCN
L033	36.00	6.875	8		THIOCYANATE-COMB.R
L010	55.00	7.000	9		COLORIMETRIC
L027	63.00	7.500	9		TECHNICON
L002	67.50	7.750	8		COLOURIMETRIC
L024	62.00	9.250	8		AUTO-THIOCYANATE
L023	74.00	9.250	8	LVLVL	
L058	77.50	9.688	8	VH	TECHNICON
L038	80.00	9.778	9		RESINES
L049	20.00	10.000	2		TECHNICON
L044	94.00	10.444	9		HG(NH ₄) ₂ TIT.
L046	94.00	10.889	9		COLORIMETRIC
L006	105.00	11.667	9		AUTO ANALYZER
L004	108.00	12.000	8	HVL	L7203L
L009	111.50	12.688	8	VL	
L001	102.00	12.750	8		TITRAGE CONDUCTIV
L021	102.00	12.875	8		TECHNICON AA II
L061	122.00	14.000	8		MERCURIC THIOCYAN
L045	127.50	14.375	9		MERC-THIOBLUE
L020B	127.00	14.222	9		TITRATION
L023	132.00	15.000	8	HVHHH	SPECIFIC ION.
L043	132.00	16.000	9		SPECN DIS-R.
L063	132.00	16.778	9	VHVHVHVHVH	AUTO THIOCYANATE
L032	132.00	19.000	8	VHVHVHVH	DESCAARIE ANALYSER
L062	179.50	21.188	9	VHVHVHVH	AUTOANALYZER
L046	193.00	21.444	9	VHVHVHVHVH	AG TITRATION
L022	181.50	22.688	8		
OVERALL AVERAGE RANK IS		12.650			

84/03/27

PARAMETER: 17092 CHLORIDE (ALL METHODS)

MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= .2500 CONCENTRATION ERROR INCREMENT= .1500
 LABORATORIES VET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

1			2			3			5			6			7		
SAMPLE	LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	4.3	2.9	8.50	2.50	4	29.00	12.50	.6	12.50	.8	4.50	6.5	4.50	9.01	9.01	6.5	9.01
L003	4.4	3.5	11.50	0.00	5	34.50	14.50	.5	34.50	.8	4.50	7.1	4.50	33.51	33.51	7.1	33.51
L004	4.4	3.5	36.00	20.50	2	26.00	34.00	.7	26.00	.9	27.50	8.26	27.50	41.00	41.00	8.26	41.00
L006	4.8	0.00	8.50	0.00	12	19.00	17.00	.1	19.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L007	6.5	0.00	40.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L009	4.8	0.00	8.50	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L010	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L011	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L013	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L014	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L015	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L016	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L019	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L020	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L020B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L021	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L022	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L022B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L023	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L024	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L025	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L026	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L027	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L028	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L029	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L031A	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L031B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L032B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L033	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L033B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L045	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L046	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L048	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L048B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L049	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L050	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L053	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L057	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L060	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L061B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L062B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L063B	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
L064	4.9	0.00	14.00	0.00	12	23.00	17.00	.1	23.00	.6	25.50	8.10	25.50	40.01	40.01	8.10	40.01
MEDIAN	5.01	3.16	21.00	10.00	3.286	14.00	0.00	.71	34.00	.896	16.00	6.67	16.00	13.00	13.00	6.67	13.00
STONC.	5.060	3.200	21.00	10.00	3.360	14.00	0.00	.640	34.00	.903	16.00	6.845	16.00	13.00	13.00	6.845	13.00

84/03/27

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PARAMETER: 17092 CHLORIDE (ALL METHODS) MG/L

SAMPLE LAB NO	8		9		10	
	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	1.3	5.50	1.3	10.50	105.2	27.00
L003	1.3	5.50	1.3	10.50	93.	5.00
L004	1.3	21.50	1.3	23.50	113.60	34.50
L006	1.45	11.50	1.9	20.00	123.4	38.00
L007	1.50	21.50	1.25	17.00	104.0	18.50
L009	1.50	21.50	1.4	35.00	101.	12.00
L010	1.35	17.00	1.33	15.50	1.05	1.00
L011	1.61	37.00	1.39	31.50	105.5	34.00
L013	1.49	21.50	1.20	10.50	111.50	32.00
L014	1.50	21.50	1.30	23.50	104.0	18.50
L015	1.22	29.00	1.20	27.50	99.8	7.00
L019	1.54	28.00	1.31	30.00	130. V4	42.00
L020B	1.60	33.00	1.36	30.00	128. H	41.00
L020B	1.6	33.00	1.2	10.50	103.	16.00
L021	1.64	39.50	1.4	41.00	100.	9.00
L022	1.5	42.00	1.1	4.00	90.	4.00
L022B	1.7	42.00	1.2	4.00	106. V4	25.50
L023	1.15	9.50	1.12	29.00	155.	44.00
L024	1.4	33.00	1.3	42.00	107.	22.50
L025	1.32	12.00	1.26	23.50	105.	0.00
L027	1.46	12.00	1.3	0.00	99.0	6.00
L028	2.0	26.50	1.19	6.50	101.	12.00
L031A	1.53	21.50	1.4	0.00	102.	14.50
L031B	1.5	21.50	1.3	38.50	126. H	40.00
L032	7.3A	45.00	1.6	38.50	113.	34.50
L032B	1.14	4.00	1.2	10.50	102.	25.50
L033	1.4	0.00	1.3	23.50	105.	23.50
L042	1.60	21.50	1.3	38.50	101.	12.00
L045	1.6	33.00	1.2	10.50	133.5	37.00
L046	1.7	44.00	1.3	35.00	116.	0.00
L048	1.38	8.50	1.4	0.00	137. V4	43.00
L049	1.6	33.00	1.22	35.00	107.	30.50
L053	1.45	21.50	1.9	40.00	110.5	10.50
L057	1.3	14.50	1.23	15.50	110.	30.50
L058	1.470	14.50	1.4	35.00	94.3	8.00
L060	1.64	39.50	1.3	35.00	115.000	
L061B	1.53	33.00	1.4	40.00		
L062B	1.6	44.00	1.4	40.00		
L063B	1.6	44.00	1.4	40.00		
L064	1.72	42.00	1.39	35.00		
L064	1.48	16.00	1.26	18.50		
MEDIAN	1.500		1.300			
MONC.						

CHLORIDE (ALL METHODS)

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LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L002	103.00	12.111	9		TECHNICON
L003	103.00	12.000	8		DIONEX
L004	181.50	20.197	9		7720SL
L006	175.00	20.575	8	HVL HHH	AUTO ANALYZER
L007	133.00	16.625	8		
L010	101.00	12.625	8	VL	THIOCYAN - COMB. REA
L011	136.00	16.500	8	LLH	IC
L013	167.00	19.625	8		I.C.
L014	167.00	19.625	8		COLORIMETRIC
L016	148.00	16.444	9		CHROMAT. IONIQUE
L019	206.00	22.889	8		I.C.
L020	206.00	22.889	8		MERC. THIOBLUE
L020B	202.00	22.444	8		
L021	202.00	22.444	8	H	ION CHROMATOGRAPHY
L022	239.50	29.938	8	VHV HVHVH VHV HH HVHVH LVL VL	AG TITRATION
L022B	313.00	39.125	8		AUTO-THIOCYANATE
L023	127.50	15.938	8		COLORIMETRIC
L024	108.50	13.563	8		I.C.
L025	206.00	22.889	8		COLORIMETRIC
L027	98.00	10.889	9		WESCAN IC
L028	329.00	36.556	9	VHV HVHVH HVHVH VL VHVH	
L029	130.50	15.167	9		
L031A	191.00	21.225	8		TITRAGE CONDUCTIV
L031B	32.50	3.125	8		RESINES
L032	264.00	33.000	8	VHV HVHVHVH	AUTO-THIOCYANATE
L032B	82.00	10.250	8	L	DIONEX
L033	42.00	5.250	4		AUTOSCN
L034	261.50	32.688	9	VHVHVH	SPECIFIC ION
L035	315.00	39.375	9		MERCURIC THIOCYAN
L036	122.00	15.250	9	VHVHVH	AUTOANALYZER
L037	170.00	18.889	9		I.C.
L038	169.00	18.778	9		TECHNICON
L039	155.00	17.278	9	VH	IC (NO3)2 TIT.
L040	138.00	16.444	9		TITRATION
L041	155.00	17.278	8	VLVLVLVL	I.C.
L042	155.00	17.278	9		IC
L061	91.00	10.333	3		IC
L061B	72.50	8.944	3	VHVHVH	TECHNICON AA II
L062	263.50	32.944	9	HVHVHVH	IC
L062B	312.50	34.722	9		DESCARTE ANALYSER
L063	269.00	29.889	9		FESCAN DISC R.
L063B	253.50	28.167	9		IC DIONEX MODEL 10
L064	242.00	26.889	9		ION CHROM
L065	115.50	14.563	8		
OVERALL AVERAGE RANK IS		22.000			

LAB NO.	TOTAL RANK	AVERAGE RANK	NO OF SAMPLES RANKED	SUMMARY OF FLAGGING	BIASED LOW INSUFFICIENT DATA	METHOD CODING
L057	52.50	6.563	8	VLVLVLVL		DIONEX
L032B	52.50	10.250	8			AUTO SCN
L033	42.00	10.500	4			COLORIMETRIC
L027	98.00	10.889	9			DIONEX
L003	89.00	11.000	9			TECHNICON
L002	109.00	12.111	9			THIOCYAN - COMB. REA
L010	101.00	12.625	8			I.C.
L048	122.00	13.556	9			COLORIMETRIC
L024	1108.50	13.563	8			ION CHROM
L066	1116.50	14.563	8			AUTO-THIOCYANATE
L023	127.50	15.938	8	LVLVL		IC
L013	123.50	16.000	8			RESINES
L031B	132.50	16.250	8			CHROMAT. IONIQUE
L019	148.00	17.278	2			I.C.
L058	155.50	17.278	9	VH		IC
L050	155.50	17.375	9			HG (NO3)2 TIT.
L009	139.00	17.556	8			TECHNICON
L060	154.00	18.444	9			I.C.
L048B	166.00	18.889	9	LLH		17203L
L014	170.00	19.750	8			COLORIMETRIC
L004	181.00	20.167	9			AUTO ANALYZER
L029	190.50	21.167	9	HVL		TITRAGE CONDUCTIV
L006	171.50	21.444	8	H		TECHNICON AA II
L031A	202.00	22.250	8	VL		MERCURIC THIOCYAN
L011	186.00	22.500	8			I.C.
L061B	212.50	23.417	3			MERC. THIMOBLEUE
L020	202.00	23.750	8			TITRATION
L025	208.00	24.000	8			IC DIONEX MODEL 10
L020B	233.00	24.889	9			SPECIFIC ION.
L053	232.00	25.000	3			FESCN DISCR
L063B	253.00	25.889	9	VHV HHH		ION CHROMATOGRAPHY
L042	291.00	26.375	8	HHH		IC
L007	233.00	26.889	3			IC
L022	269.50	28.344	9	VHV HHHVH		AUTO-THIOCYANATE
L061	264.00	30.000	3	VHV HHHVH		DESCARTRE ANALYSER
L032B	264.00	30.000	8	VHV HHHVH		WESCAN IC
L028	312.50	34.722	9	VHV HHHVH VHV1 VLVH VHV	BIASED HIGH	AUTOANALYZER
L046	329.00	36.556	9	VHV HHH	BIASED HIGH	AG TITRATION
L022B	335.00	37.222	9	VHV HHHVH VHH		
L022B	335.00	37.750	8			
OVERALL AVERAGE RANK IS		22.000				

84/03/27

PARAMETER: 150.00 SULFATE, IC METHOD

MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= .7600 CONCENTRATION ERROR INCREMENT= .2000
 LABORATORIES WET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK	RANK	RANK	RANK
L003	2.7	3.00	3.48	4.9	5.48	19.8
L007	2.83	0.00	3.48	5.38	5.38	16.8
L009	2.7	0.00	3.48	4.8	5.38	17.5
L013	2.97	0.00	3.48	4.81	5.38	19.4
L014	3.00	0.00	3.48	4.80	5.38	12.00
L019	3.25	3.43	3.48	4.76	5.38	19.20
L020	2.70	0.00	3.48	5.07	5.38	18.5
L021	3.22	3.68	3.48	5.23	5.38	21.87
L022	2.84	0.00	3.48	5.01	5.38	19.87
L024	2.25	0.00	3.48	5.01	5.38	24.00
L025	2.67	0.00	3.48	4.90	5.38	20.5
L027	3.37	3.49	3.48	4.92	5.38	22.00
L028	3.37	3.32	3.48	4.87	5.38	20.5
L032	3.34	0.00	3.48	4.95	5.38	20.18
L048	2.85	0.00	3.48	4.61	5.38	16.8
L050	2.85	0.00	3.48	4.61	5.38	19.5
L057	2.89	3.45	3.48	4.61	5.38	19.5
L058	2.89	3.45	3.48	4.61	5.38	19.5
L060	2.80	3.32	3.48	4.85	5.38	17.6
L061	3.37	3.32	3.48	4.87	5.38	19.5
L062	3.37	3.92	3.48	4.87	5.38	19.5
L063	2.86	3.44	3.48	4.87	5.38	19.5
L066	2.86	3.44	3.48	4.87	5.38	19.5
MEDIAN	2.915	3.455	3.485	4.925	5.400	19.250
CONC.						

SAMPLE LAB NO	8	9	10
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK
L003	3.48	3.42	35.5
L007	3.48	3.42	37.0
L009	3.48	3.42	37.0
L013	3.48	3.42	37.0
L014	3.48	3.42	37.0
L019	3.48	3.42	37.0
L020	3.48	3.42	37.0
L021	3.48	3.42	37.0
L022	3.48	3.42	37.0
L024	3.48	3.42	37.0
L025	3.48	3.42	37.0
L027	3.48	3.42	37.0
L028	3.48	3.42	37.0
L032	3.48	3.42	37.0
L048	3.48	3.42	37.0
L050	3.48	3.42	37.0
L057	3.48	3.42	37.0
L058	3.48	3.42	37.0
L060	3.48	3.42	37.0
L061	3.48	3.42	37.0
L062	3.48	3.42	37.0
L063	3.48	3.42	37.0
L066	3.48	3.42	37.0
MEDIAN	3.48	3.42	37.0
CONC.			

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L003	15.50	15.50	8		DIONEX
L007	19.50	19.50	8		IC
L009	19.50	19.50	8	VHVH	IC
L013	11.50	11.50	8		IC CHROMAT. IONIQUE
L014	10.50	10.50	8		I.C.
L019	10.50	10.50	9		I.C.
L020	17.50	17.50	8		ION CHROMATOGRAPHY
L021	19.50	19.50	8	VH	I.C.
L022	11.50	11.50	8		WESCAN IC
L024	11.50	11.50	8		DIONEX
L025	12.50	12.50	8		I.C.
L027	13.50	13.50	9		WESCAN IC
L028	13.50	13.50	9		DIONEX
L029	16.50	16.50	9		I.C.
L032	16.50	16.50	9		I.C.
L048	12.50	12.50	9	H	I.C.
L050	12.50	12.50	9		IC
L057	11.50	11.50	9		IC
L058	11.50	11.50	9		IC
L060	11.50	11.50	9		IC
L061	12.50	12.50	9		IC
L062	12.50	12.50	9		IC
L063	12.50	12.50	9		IC
L064	12.50	12.50	9		IC
L066	12.50	12.50	9		IC
L066	12.50	12.50	9		IC DIONEX MODEL 10
L066	12.50	12.50	9		ION CHROM.
OVERALL AVERAGE RANK IS	12.294				

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L061	25.00	25.00	3		IC
L009	25.00	25.00	8		DIONEX
L012	25.00	25.00	8		DIONEX
L017	25.00	25.00	8		I.C.
L048	25.00	25.00	9		I.C.
L050	25.00	25.00	8		I.C.
L066	25.00	25.00	9		ION CHROM.
L013	25.00	25.00	9		IC DIONEX MODEL 10
L027	25.00	25.00	9		IC
L019	25.00	25.00	9		IC
L058	25.00	25.00	9		CHROMAT. IONIQUE
L029	25.00	25.00	9		I.C.
L057	25.00	25.00	9		I.C.
L007	25.00	25.00	9		I.C.
L050	25.00	25.00	9	H	I.C.
L062	25.00	25.00	9	VHVH	I.C.
L014	25.00	25.00	8		ION CHROMATOGRAPHY
L024	25.00	25.00	8		I.C.
L025	25.00	25.00	8		I.C.
L063	25.00	25.00	9		WESCAN IC
L028	25.00	25.00	9		I.C.
L021	25.00	25.00	9		I.C.
OVERALL AVERAGE RANK IS	12.284				

84/03/27

PARAMETER: 160011 SULFATE NON IC METHODS MG/L

LRTAP IYERLAB STUDY NO. L5:MAJOR IONS IN WATER

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= .7600 CONCENTRATION ERROR INCREMENT= .2000
LABORATORIES FROM TO REPORT: L001,L015,L017,L040,L043,L051,L054,L056
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1	2	3	5	6	7
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	3.1	10.00	3.6	8.50	5.3	8.00
L003	3.4	15.50	3.2	3.50	5.0	4.00
L004	3.4	15.50	3.9	14.50	5.5	14.50
L006	3.4	15.50	3.14	2.00	4.79	14.00
L010	3.25	0.00	3.16	8.50	5.5	14.50
L011	3.25	0.00	3.67	11.00	5.03	5.00
L016	3.97	17.00	5.03	5.00	5.44	13.00
L020	3.1	10.00	3.8	13.00	5.2	11.50
L021	3.1	10.00	3.8	13.00	5.2	11.50
L031	3.0	8.00	4.9	14.50	5.3	16.00
L031A	3.0	8.00	4.9	14.50	5.3	16.00
L031B	3.0	8.00	4.9	14.50	5.3	16.00
L032	3.41	17.00	4.73	7.00	5.53	16.00
L033	3.4	17.00	5.4	12.00	5.53	16.00
L033A	3.4	17.00	5.4	12.00	5.53	16.00
L033B	3.4	17.00	5.4	12.00	5.53	16.00
L034	3.4	17.00	5.4	12.00	5.53	16.00
L035	3.4	17.00	5.4	12.00	5.53	16.00
L036	3.4	17.00	5.4	12.00	5.53	16.00
L037	3.4	17.00	5.4	12.00	5.53	16.00
L038	3.4	17.00	5.4	12.00	5.53	16.00
L039	3.4	17.00	5.4	12.00	5.53	16.00
L040	3.4	17.00	5.4	12.00	5.53	16.00
L041	3.4	17.00	5.4	12.00	5.53	16.00
L042	3.4	17.00	5.4	12.00	5.53	16.00
L043	3.4	17.00	5.4	12.00	5.53	16.00
L044	3.4	17.00	5.4	12.00	5.53	16.00
L045	3.4	17.00	5.4	12.00	5.53	16.00
L046	3.4	17.00	5.4	12.00	5.53	16.00
L047	3.4	17.00	5.4	12.00	5.53	16.00
L048	3.4	17.00	5.4	12.00	5.53	16.00
L049	3.4	17.00	5.4	12.00	5.53	16.00
L050	3.4	17.00	5.4	12.00	5.53	16.00
L051	3.4	17.00	5.4	12.00	5.53	16.00
L052	3.4	17.00	5.4	12.00	5.53	16.00
L053	3.4	17.00	5.4	12.00	5.53	16.00
L054	3.4	17.00	5.4	12.00	5.53	16.00
L055	3.4	17.00	5.4	12.00	5.53	16.00
L056	3.4	17.00	5.4	12.00	5.53	16.00
L057	3.4	17.00	5.4	12.00	5.53	16.00
L058	3.4	17.00	5.4	12.00	5.53	16.00
L059	3.4	17.00	5.4	12.00	5.53	16.00
L060	3.4	17.00	5.4	12.00	5.53	16.00
L061	3.4	17.00	5.4	12.00	5.53	16.00
L062	3.4	17.00	5.4	12.00	5.53	16.00
L063	3.4	17.00	5.4	12.00	5.53	16.00
MEAN	3.100		3.600		5.400	
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LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L003	94.00	10.444	9		TECHNICON
L004	143.00	16.563	8	H	TECHNICON MTB
L006	25.50	13.184	9		16306L
L010	85.00	10.625	8	L	AUTO ANALYZER
L011	74.00	9.250	8		MTB-AUTO
L020B	95.50	10.688	9		TECHNICON CALMAGIT
L023	79.00	9.875	8		RESIN
L031A	16.50	9.000	8		TECHNICON CALMAGIT
L032	107.00	13.375	8	H	RESIN
L033	149.00	16.556	9		TECHNICON CALMAGIT
L045	56.00	6.222	9	VHVHVHVHVHVHV	AUTOMATED MTB
L046	21.50	2.389	9	LLLL	AUTO MTB
L048	181.00	15.833	9		GRAVIMETRIC
L049	98.00	10.889	9	VLVLLVHHVL	U.V.-MTB
L053	98.00	10.889	9		AUTOANALYZER
L061	123.00	13.667	9	VHVHVH	TURBIDIMETRIC
L062	103.00	11.667	9	VHVHVH	COLORIMETRIC
L063	115.00	12.778	9		TECHNICON AA II
OVERALL AVERAGE		10.165			AUTO-TURB.
RANK IS					

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L046	21.50	2.389	9	LLLL	AUTOANALYZER
L006	25.50	3.188	8		AUTO ANALYZER
L045	32.50	6.278	9		U.V.-MTB
L003	94.00	10.444	9		TECHNICON MTB
L016	72.00	8.000	9		RESIN
L031B	16.50	8.250	9		TECHNICON CALMAGIT
L031A	72.00	9.000	8		TURBIDIMETRIC
L049	61.00	7.625	8	VLVLLVHHVL	RESIN
L011	74.00	9.250	9		TECHNICON CALMAGIT
L061	23.00	2.556	8		TURBIDIMETRIC
L023	73.00	8.111	9		TECHNICON AA II
L002	94.00	10.444	9		TECHNICON
L010	35.50	3.944	9	L	AUTO. MTB
L020B	95.50	10.625	8		TECHNICON
L053	98.00	10.889	9		MTB-AUTO
L062	105.00	11.667	9	VHVHVH	METHYL-THIMO
L063	115.00	12.778	9	VHVHVH	COLORIMETRIC
L032	104.00	11.556	9	H	TURBIDIMETRIC
L033	142.50	15.833	8		AUTO-TURB.
L048	142.50	15.833	8		AUTOMATED MTB
L004	149.00	16.556	9	H	AUTO MTB
L042	149.00	16.556	9	VHVHVHVHVHVHV	TECHNICON
OVERALL AVERAGE		10.165			16306L
RANK IS					GRAVIMETRIC

84/03/27

PARAMETER: 16092 SULFATE (ALL METHODS) MG/L

SAMPLE LAB NO	8			9			10		
	REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK	
L002	8	41.50		3	13.50		35.1	13.00	
L003		15.50		3	19.50		35.	13.00	
L003B		35.00		1	39.00		36.6	11.50	
L004	1.3 H	44.00		1	39.00		39.90	39.00	
L005	1.29	39.50		42	32.00		39.5	39.00	
L007	48	33.00		3	19.50		37.0	23.00	
L009	31	20.00		3	19.50		37.0	19.00	
L010	61	39.50		22	12.50		35.9	10.00	
L011	46T	32.00		18	12.50		35.3	9.00	
L013	32	29.50		20	12.50		37.8	27.00	
L014	40	29.50		20	12.50		36.9	16.00	
L016	02	1.00		29	29.00		37.61	26.00	
L019	30	15.50		11	7.00		37.3	28.00	
L020	41	22.50		11	7.00		36.3	14.00	
L020B	32	22.50		5.06 VH	42.00		37.2	21.00	
L021	31	15.50		2	26.00		42.56	44.00	
L023	37	15.50		24	15.50		30.	2.00	
L024	37	26.00		2	15.50		37.	19.00	
L025	30T	15.50		24	15.50		38.41	34.00	
L027	315	15.50		26	16.00		40.0	41.00	
L029	315	35.00		41	26.00		38.3	33.00	
L031A	5	35.00		1	27.00		37.6	24.50	
L031B		30.00		1	0.00		33.5	6.00	
L032	1.237 H	43.00		3.41	29.00		36.94	17.00	
L032B	5.0	15.50		17	29.00		37.7	17.00	
L033	5.33 VH	45.00		59 VH	0.00		37.9	19.00	
L043	1	45.00		7	43.50		33.5	39.00	
L045	1	2.00		7	39.50		27.5 L	6.50	
L046	20	29.50		3	19.50		38.0	1.00	
L048B	40	39.50		3.8 VL	39.00		39.3	37.00	
L049	1.24 H	42.00		1.2 VL	1.00		40.3	41.00	
L053	54	38.00		42	36.50		37.3	22.00	
L055	33	29.50		45	34.00		37.6	24.50	
L057	3	15.50		3.5	35.50		36.8	15.00	
L058	29	9.50		3.5	23.50		40.7	41.00	
L060	227	7.50		3	0.00		0.00	35.00	
L061B	236	25.00		3	19.50		36.	0.00	
L062B	21	4.50		3	19.50		42.	11.50	
L063B	3	15.50		3.4	26.00		32.	43.00	
L063B	35	24.00		3.83	39.00		38.2	5.00	
L064	53	37.00		3.3	41.50		39.	32.00	
L066	292	11.00		3.30	19.50		38.0	36.00	
MONC.	320			3.300			37.400	30.00	

84/03/27

PARAMETER: 15092 SULFATE (ALL METHODS)

MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= .7600 CONCENTRATION ERROR INCREMENT= .2000
 LABORATORIES VET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1			2			3			5			6			7		
	REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK	
L002	3.1	28.00			19.00		3.6	28.00		4.9	23.00		5.3	16.00		19.8	32.50	
L003	2.8	17.00		4.2	0.00		3.2	11.50		4.3	23.00		5.4	24.50		19.5	18.50	
L003B	2.4	35.50			0.00		3.2	36.50		4.3	4.00		5.5	37.50		21.3	41.00	
L006	3.3	12.00		4.7 H	21.00		3.9	32.00		4.2	4.00		5.5	37.50		21.3	41.00	
L007	2.7	16.00			0.00		3.4	16.50		4.2	4.00		5.5	37.50		21.3	41.00	
L009	2.7	16.00			0.00		3.4	16.50		4.2	4.00		5.5	37.50		21.3	41.00	
L010	3.3	35.50			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L011	3.3	35.50			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L013	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L014	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L016	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L019	2.9	33.00		4.50	20.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L020	2.9	33.00		3.48	11.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L020B	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L022	2.9	33.00		3.68	16.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L023	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L024	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L025	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L027	2.9	33.00		3.49	12.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L028	2.9	33.00		3.32	13.50		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L031A	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L031B	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L032	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L033	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L035	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L037	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L038	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L041A	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L041B	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L042	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L045	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L046	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L048	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L048B	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L049	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L050	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L053	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L057	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L060	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L061	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L061B	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L062	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L062B	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L063	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L063B	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L064	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
L066	2.9	33.00			0.00		3.6	28.00		4.2	4.00		5.5	37.50		21.3	41.00	
MEAN	2.96	15.50			8.00		3.35	27.00		4.6	0.00		5.32	18.50		19.8	32.50	
SD	2.37	3.500			3.500		3.500	3.500		4.900	4.900		5.400	5.400		19.205	19.205	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L002	213.00	23.667	9		TECHNICON
L003	126.50	15.063	8		DIONEX
L003B	330.50	36.722	8	HH	TECHNICON MTB
L006	38.50	4.813	8		16306L
L007	190.50	23.813	8		AUTO ANALYZER
L009	122.00	15.250	8	L	MTB-AUTO
L010	139.50	23.688	8		IC
L011	174.50	21.438	8		IC
L013	146.50	18.688	8	VHVH	I.C.
L014	205.50	25.688	8		M.T.B
L016	141.50	17.722	9		CHROMATOGRAPHIE IO
L019	174.50	19.333	9		I.C.
L020	145.00	18.325	8		METHLY-THMO
L020B	184.50	23.063	8		ION CHROMATOGRAPHY
L021	305.50	38.944	9	VH	AUTO. MTB
L022	210.50	26.375	8		I.C.
L023	165.00	20.625	8		MESCAN IC
L024	199.00	24.875	8		TECHNICON CALMAGIT
L025	177.50	22.188	8		RESINEX
L027	274.50	34.313	9		AUTOMATED MTB
L028	162.50	20.313	8		DIONEX
L031A	162.50	20.313	8		AUTO MTB
L031B	223.00	27.875	9	H	GRAVIMETRIC
L032B	114.00	14.250	8		U.V.-M.T.B.
L033	327.00	40.875	9	VHV HVVHVHVHVH	AUTOANALYZER
L042	128.50	16.063	9	LLL	I.C.
L045	123.00	15.375	9		TECHNICON
L046	148.00	18.444	9		TURBIDIMETRIC
L048B	334.00	41.750	9	H	IC
L049	175.00	21.875	9	LLL VL HHVL	COLORIMETRIC
L050	213.00	26.625	9		I.C.
L053	240.50	30.063	9		IC
L057	197.50	24.688	9		IC
L058	173.50	21.688	9		IC
L060	155.00	19.375	9		IC
L061B	195.50	24.438	9	VHV HVH	TECHNICON AA II
L062B	215.50	26.938	9		TURBIDIMETRIC
L063B	226.50	28.313	9	VHVHVH	IC
L064	221.50	27.688	9	HVH	AUTO-TURB.
L066	151.50	18.938	9		IC DIONEX MODEL 10
L066	142.00	17.750	8		ION CHROM.
OVERALL AVERAGE RANK IS		21.942			

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L010	5.00	2.500	2	LL	POTENTIOMETRIC TITRATION
L010B	97.00	12.125	8		
L011	30.00	11.313	9	L	TITRATION
L016	156.00	17.333	9	VHVHVHVHVHVH	GRANS-PLT. PH 8.3
L020	125.00	15.625	8	H	POTENTIOMETRIC
L022	100.50	12.563	8		AUTO-TITR+N
L023	53.00	7.375	8		
L025	28.00	3.500	8	LVL	POTENTIOMETRIC
L029	62.00	6.889	9	L	GRANSPLT TITRA
L030	53.00	5.889	9		MANUAL TITRATION
L032	26.00	3.250	8	VLVLL	TO PH 8.3
L033	0.00	0.000	0		INSUFFICIENT DATA
L042	159.00	17.667	9	VHVHVHVHVHVHVH	INSUFFICIENT DATA
L045	43.00	9.800	5	VH	AUTO PHENOLPHTHAL
L046	128.50	14.278	9		
L049	28.50	14.000	2		TO PH 8.3
L053	74.50	18.000	9		TITRATION
L057	90.50	10.056	9	H	TITRATION
L060	113.50	12.611	9	VLVLLVLVLL	EP TITR.
L062	113.50	12.611	6		GRAN TITRA (ACIDITY
L063	110.00	12.222	9		TITRATION TO PH 8.
L064	100.00	12.500	8		
L066	23.00	5.500	8	LL	
OVERALL AVERAGE RANK IS		10.054			

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L033	0.00	0.000	0	VLVLLVLVLL	MANUAL TITRATION
L062	2.00	1.000	2	LL	TITRATION
L080	26.00	2.500	8	VLVLL	POTENTIOMETRIC
L082	26.00	2.500	8	VLVLL	GRANSPLT TITRA
L086	29.00	3.500	8	LVL	AUTO-TITR+N PH 8.
L089	33.00	4.000	9	LL	POTENTIOMETRIC
L099	62.00	6.889	9	L	POTENTIOMETRIC
L033	59.00	7.375	9		TITRATION
L035	74.50	8.278	9		AUTO PHENOLPHTHA
L045	49.00	6.000	5		
L057	90.50	10.056	8		
L011B	97.00	11.313	8	L	TITRATION
L063	110.00	12.125	9		EP TITR.
L064	100.00	12.500	8		GRAN TITRA (ACIDITY
L062	100.50	12.563	8		TITRATION PH 8.3
L060	113.50	12.611	9	H	TITRATION
L049	113.50	12.611	9	HH	TO PH 8.3
L046	128.50	14.000	2		
L020	128.50	14.278	9	VH	GRANS-PLT.
L016	155.00	15.625	8	VHVHVHVHVHVHVH	TITRATION
L042	159.00	17.333	9	VHVHVHVHVHVHVH	TO PH 8.3
OVERALL AVERAGE RANK IS		10.054			

84/03/27

PARAMETER: 01091 ACIDITY

MGC03/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5:MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= .7500 CONCENTRATION ERROR INCREMENT= .5000
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L010	1.0M	0.00	1.0M	0.00	1.5 L	2.00
L010B	3.0	16.00	2.0	11.50	4.5	12.50
L011	2.57	11.00	0.00	19.00	4.62	13.00
L016	5.10 VH	19.00	3.70 VH	16.00	5.40	20.00
L020	3.6	18.00	5.0 VH	18.00	5.2	19.00
L022	2.24	4.00	2.0	11.50	5.9	16.00
L023	2.03	6.00	1.76	10.00	3.97	8.00
L029	2.71	14.00	1.64	12.00	3.97	8.00
L030	2.24	18.00	1.53	6.00	3.55	5.00
L032	2.263	7.00	1.44	6.00	3.55	5.00
L042	9.6 VH	20.00	0.8317	3.00	2.43	3.00
L046	3.2	17.00	4.8 VH	17.00	11.5 VH	22.00
L053	2.6	12.50	2.4	13.00	5.5	13.50
L057	1.3	9.00	1.5	9.00	4.4	11.50
L060	1.6 VL	3.00	3.0	15.00	4.0	11.50
L062	2.06	15.00	3.10 VL	15.00	6.0	21.00
L064	1.791	12.50	2.47	14.00	5.10 VL	17.00
L066	2.535	2.00	1.934	4.00	5.1	17.00
MEDIAN			1.039		3.148	
CONC.			1.700		4.600	
			2.650		1.200	

SAMPLE	8	9	10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L010	1.0M	0.00	1.0M	0.00
L010B	2.0	14.00	1.5	8.00
L011	2.05	16.00	2.16	14.00
L016	3.10 VH	19.00	2.40	17.00
L020	1.5	10.50	2.0	12.00
L022	1.44	18.00	2.0	12.00
L023	1.659	8.00	1.60	16.00
L025	1.43	9.00	1.841	19.00
L029	1.02	4.00	1.38	7.00
L032	1.513a	2.00	1.22	5.00
L042	5.8 VH	20.00	1.2728 L	5.00
L046	3.2	17.00	7.7 VH	19.00
L049	1.5	17.00	1.1	3.00
L053	2.1	17.00	2.3	16.00
L057	1.2	6.50	1.8	10.00
L060	2.0	14.00	3.0 H	18.00
L062	2.0	14.00	2.0	12.00
L064	2.47	18.00	1.11	4.00
L066	1.9	12.00	2.2	15.00
MEDIAN	1.935	9.50	1.302	15.00
CONC.	1.500	1.600	1.800	16.00

LAB NO. TOTAL AVERAGE RANK NO. OF SAMPLES RANKED SUMMARY OF PLUGGING

LAB NO.	TOTAL AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF PLUGGING	METHOD CODING
L046	23.00	9	LLL	AUTOANALYZER
L003	31.50	8		AUTO ANALYZER
L003B	36.50	8		TECHNICON MTB
L031B	28.00	2		RESINES
L022B	114.50	8		DIONEX
L045	124.50	9		U.V.-M.T.B.
L001	122.00	8		IC
L001	166.00	3		M.T.B
L006	141.50	9		DIONEX
L003	127.00	8		IC
L048	168.00	9		IC DIONEX MODEL 10
L064	155.50	9		ION CHROM.
L060	152.00	8		IC
L020	143.00	8		IC
L013	173.50	8		CHROMATOGRAPHIE IO
L058	173.50	9		TURBIDIMETRIC
L019	174.00	9		TECHNICON AA II
L049	175.00	3		TECHNICON CALMAGIT
L061B	33.50	3		AUTO. MTB
L031A	165.00	8		
L023	189.00	9		
L029	171.50	8		
L011	197.00	8		
L051	197.50	8		
L020B	184.50	8		
L050	213.00	9	H	
L002	213.00	9	L	
L010	189.50	8		
L007	180.50	8		
L062	215.50	8	VHVHVH	
L024	219.00	8		
L062B	226.50	8		
L014	220.50	8	VHVH	
L022	240.50	8		
L053	240.50	8		
L033	254.50	2		
L025	222.00	8	VHVHVH	
L063	225.50	9	H	
L032	227.00	8		
L028	247.50	9	HVH	
L063B	248.50	9	VH	
L021	305.50	9	VHVHVHVHVHVHVH	
L042	322.00	9	HH	
L004	330.50	3	HH	
L048B	334.00	3	H	
OVERALL AVERAGE	21.942			
RANK IS				

84/03/27

PARAMETER: 05192 TOTAL ALKALINITY

MG CAC03/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5:MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.5000 BASIC ACCEPTABLE ERROR= 1.2000 CONCENTRATION ERROR INCREMENT= .0000
 LABORATORIES YET TO REPORT: L001,L015,L017,L040,L043,L051,L054,L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1			2			3			5			6			7		
	REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK	
L002	1.5	13.00		2.1	7.00		5.1	14.00		1.9	8.00		1.9	8.00		85.8	22.00	
L003	.5T	8.00		1.4 L	1.00		4.5	6.50		.5T	5.00		.5T	5.00		79.8	4.50	
L004	0.1H	2.00			0.00		4.0	9.00		0.1H	2.50		0.1H	2.50		79.0	7.00	
L006	1.5H	0.00			0.00		4.0	9.00		1.0H	0.00		1.0H	0.00		80.5	9.00	
L010	1.5H	14.00			0.00		6.18	16.00		1.0H	0.00		1.0H	0.00		79.0	4.50	
L011	0.00 L	12.00		1.52 L	2.00		3.95	15.00		0.00	2.50		0.00	2.50		81.3	11.00	
L016	.90T	17.00		1.65	3.00		4.40	5.00		0.00	0.00		0.00	0.00		81.26	10.00	
L022	3.0 H	10.00			0.00		7.3 VH	22.00		0.00	0.00		0.00	0.00		79.6	6.00	
L023	1.5H	20.00			0.00		6.22	17.00		0.00	2.50		0.00	2.50		89.0	26.00	
L024	6.80T	15.00			0.00		11.3 VH	25.00		.4T	0.00		.4T	0.00		81.72	12.00	
L027	1.90T	22.00		5.7 VH	15.00		15.00	21.00		.4T	0.00		.4T	0.00		82.7	14.00	
L028	1.90T	17.00		2.28	12.00		15.00	21.00		.4T	0.00		.4T	0.00		82.7	14.00	
L030	.15 L	5.00		3.82	12.00		6.73	20.00		.4T	0.00		.4T	0.00		82.7	14.00	
L031A	1.476	12.00			0.00		4.1	3.00		.4T	0.00		.4T	0.00		82.7	14.00	
L031B	1.476	12.00			0.00		6.267	18.00		.4T	0.00		.4T	0.00		82.7	14.00	
L032	13.4 VH	23.00		5.0 VH	17.00		21.4 VH	26.00		0.00	2.50		0.00	2.50		86.18	29.00	
L042	0.05T L	4.00		1.9	5.00		4.3	8.00		13.6 VH	10.00		14.6 VH	10.00		87.1 VH	20.00	
L045	0.0 L	2.00		3.6	12.00		5.0	11.50		0.0H	0.00		0.0H	0.00		74.9	1.00	
L048	1.6	16.00		3.6	12.00		5.0	11.50		.8H	0.00		.8H	0.00		82.4	17.00	
L049	3.0 H	20.00		2.8	9.00		4.5	11.50		.2H	0.00		.2H	0.00		80.0	8.00	
L057	1.3	6.00		1.8	4.00		5.0	11.50		0.2H	0.00		0.2H	0.00		78.0	3.00	
L060	1.3	6.00		8.0 VH	16.00		10.0 VH	24.00		1.1 VH	0.00		1.1 VH	0.00		86.0	23.00	
L063	1.1	20.00		2.9	10.00		5.0	11.50		1.1	9.00		1.1	9.00		85.0	21.00	
L064	1.1	11.00			0.00			0.00		1.1	9.00		1.1	9.00		82.0	14.50	
MEAN	1.476			2.800			5.050			.750			.750			82.000		

84/03/27

MG CAC037L

PARAMETER: 06192 TOTAL ALKALINITY

SAMPLE LAB NO	8		9		10	
	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	2.5 H	17.00	40.7	13.00	2.2	16.00
L003		0.00	38.7	4.50	0.00	0.00
L004	.5T	6.00	39.6	9.00	.5T	6.50
L006	0.5T	1.00	39.9	10.00	0.5T	1.50
L010	.10W	6.00	38.0	11.50	.10W	0.00
L011	.6T	9.00	40.0	16.00	.6T	5.00
L016	.10T	2.00	41.05	8.00	.20T L	2.50
L022	3.00 VH	21.00	39.45	14.50	2.6	17.00
L023	1.8T	16.00	42.0	20.00	1.85	14.00
L024	2.6H	15.00	42.35	20.00	2.7H	18.00
L027	1.0H	18.00	42.3	11.50	1.24T	11.00
L029	1.82T	14.00	40.0	23.50	1.24T	11.00
L030	1.8T	13.00	41.0	18.50	1.1W	0.00
L031A	.15	3.00	42.3	0.00		0.00
L031B		0.00	43.99	0.00		0.00
L032	2.933 VH	10.00	42.4	24.50	2.101	15.00
L033	15.55 VH	23.00	42.4 VH	27.00	2.4 VH	0.00
L042	0.00W	0.00	38.6	6.00	0.00W	0.00
L046	1.5	13.00	38.7	4.50	0.00	0.00
L048	1.2	11.50	42.4	21.00	2.8 H	19.50
L049	1.6	8.00	38.0	2.50	1.6	8.00
L057	5.2 VH	22.00	41.0 L	14.50	.8	8.00
L060	3.0 VH	20.00	36.4	1.00	7. VH	4.00
L062	1.1T	11.50	44.0	25.50	3. H	20.00
L064	1.000	11.50	39.0	7.00	1.1T	9.50
MEOLIAN						
CONC.			41.000		1.445	
OVERALL AVERAGE		11.757				
RANK IS						

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING	
					INSUFFICIENT DATA	TOI-CO2 ACID TITRATION
L002	118.00	13.111	9	H	BIASED LOW	10101L
L003	9.00	6.000	2	L	INSUFFICIENT DATA	TITROPROCESSOR
L004	58.00	4.563	8	LL	BIASED LOW	POTENTIOMETRIC TIT
L006	21.50	4.300	5	LL	INSUFFICIENT DATA	
L010	52.50	13.125	4	LL	BIASED LOW	TITRATION
L011	43.50	15.500	9	LL	BIASED LOW	POTENTIOMETRIC
L016	31.50	18.417	7	VH VH	BIASED LOW	TITRATION: PH 4.8
L022	110.50	13.188	6	H	INSUFFICIENT DATA	TITRATION: PH 4.5
L023	105.50	15.167	6	VH VH VH H	BIASED LOW	TITRATION: PH 4.5
L024	91.00	17.438	8	VH VH VH H	INSUFFICIENT DATA	TITRATION: PH 4.5
L027	135.50	17.438	7	VH VH VH H	INSUFFICIENT DATA	POTENTIOMETRIC
L029	173.00	11.286	7	H	INSUFFICIENT DATA	RESINEX CONDUCTIV
L030	123.50	17.800	5	L	INSUFFICIENT DATA	COMPUTERIZED TITRA
L031A	14.00	14.000	0	VH	BIASED HIGH	TITRIMETER
L032	117.50	21.167	8	VH	BIASED HIGH	LO PH 3.7
L033	193.00	20.556	9	VH VH VH VH VH VH VH	INSUFFICIENT DATA	AUTO BROMOPHENO
L042	193.00	20.556	9	LL	BIASED LOW	TITRATION
L045	33.50	5.803	7	L	BIASED LOW	TO PH 4.5
L048	173.00	16.714	7	H	BIASED LOW	TITRATION
L049	73.00	10.571	7	VH VH VH VH VH VH VH	BIASED LOW	EP TITR
L057	133.50	13.729	7	L	BIASED LOW	EP TITR
L060	133.50	17.914	9	VH VH VH VH VH VH VH	BIASED LOW	METHOD 310.1
L062	161.50	17.914	9	VH VH VH VH VH VH VH	BIASED LOW	
L064	86.00	9.778	9	VH VH VH VH VH VH VH	BIASED LOW	
OVERALL AVERAGE		11.757				
RANK IS						

LAB NO.	TOTAL AVERAGE RANK	NO. OF SAMPLES RANKED	FLAGGING	METHOD	COATING
L0318	0.00	0		INSUFFICIENT DATA	RESINES
L060	3.929	7	L	BIASED LOW	TITRATION
L010	21.50	5		INSUFFICIENT DATA	POTENTIOMETRIC TIT
L003	9.00	2		INSUFFICIENT DATA	ACID TITRATION
L006	36.50	8	LL	BIASED LOW	TITROPROCESSOR
L018	33.50	7	LL	BIASED LOW	POTENTIOMETRIC
L045	24.00	5	L	INSUFFICIENT DATA	AUTO-BROMOPHENOL
L016	43.50	9	LL	BIASED LOW	TITRATION
L042	33.50	9	LL	BIASED LOW	
L031A	26.00	9	L	INSUFFICIENT DATA	10101L
L064	48.00	9		BIASED LOW	TITRAGE CONDUCTIV
L049	72.00	7		INSUFFICIENT DATA	METHOD 310.1
L057	74.00	7	H		TO PH 4.5
L029	79.00	7			
L002	113.00	9	H	INSUFFICIENT DATA	TOT-CO2
L011	52.50	4			POTENTIOMETRIC
L023	105.50	8	H		COMPUTERIZED TITRA
L024	117.50	8	VH		TITRATION :PH 4.5
L048	117.00	6			TITRATION P1 4.5
L027	112.50	8	H		TITRATION P1 4.5
L030	122.50	7	VHVHV HHH		POTENTIOMETRIC
L063	122.50	9	H		EP TITR.
L022	194.50	7	VHV VH VHV VHH		TITRATION :PH 4.8
L062	135.00	6	VHV H VHV		AUTOMATIC
L042	185.00	9	VHV HV VHV VHV VHV VHV		TO PH 3.7
L033	63.50	3	H	BIASED HIGH	TITRIMETER
				BIASED HIGH	
				INSUFFICIENT DATA	
OVERALL AVERAGE	11.757				

LAB NO.	IQIAL RANK	AVERAGE RANK	NO OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L027	32.50	3.944	9	VLVLVHVHVLVL	10110L TITRATION TO PH 4.
L004	36.00	4.000	9		COMPUTERIZED TITRA
L024	34.50	4.313	8		
L019	18.00	4.500	4		
L032	36.50	4.563	8	L	
L058	50.00	5.556	9	VLVL	
L014	49.50	6.188	8		METROHM POTENTIOMETRIC GRAN ANALYSIS ACID TITRATION GRAN TITRA. GRANS-PLT.
L030	51.00	6.375	8	VHWH	
L018	58.00	6.444	9	VLVH	
L003	44.00	7.333	3		
L053	72.50	8.056	9		
L020	71.50	8.938	8	VHWH	
OVERALL AVERAGE RANK IS		5.863			

84/03/27

PARAMETER: 06282 GRAND TITR ALK

MG/LCAC03

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRIAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0500 BASIC ACCEPTABLE ERROR= .5000 CONCENTRATION ERROR INCREMENT= .1000
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK	RANK	RANK	RANK
L003	3.02	.44 VL	4.9 VL	-17.8 VL	-2.1	18.05 VL
L004	1.02	5.00	1.07 VL	1.00	10.00	1.00
L014	.15	5.00	4.70	10.00	10.00	1.00
L018	.62T	1.64	4.31	3.55T VH	10.00	81.5
L019	.1W	2.0	4.4	4.00	10.00	81.2
L020	.3	7.00	5.1	0.0 VH	9.00	82.1
L024	.07T	4.00	4.52	-2.84T	5.00	79.64
L027	.015W	2.00	4.62	-2.61T	7.00	81.5
L030	.015W	0.00	4.88	-2.79	3.00	81.46
L032	.43 L	1.00	4.312	-2.9	6.50	82.60
L053	.3	7.00	5.1	-2.2	8.00	81.5
L058	.4	9.00	4.5	-3.5 VL	2.00	84.5
MEDIAN						
CONC.	.225	1.820	4.570	-2.700	-1.900	81.500

SAMPLE LAB NO	8	9	10
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK
L003	1.03	9.35 VL	.01T
L004	.03	40.84	1.00
L014	.15	39.44	5.00
L019	.1W	40.3	1.00
L020	.4	40.8	9.00
L024	.05T	40.75	8.00
L027	.1300	39.7	3.50
L032	.1300	41.2	3.50
L053	.4	40.67	2.00
L058	.4	42.5	10.00
MEDIAN			
CONC.	.150	40.700	-.020

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L003	44.00	7.333	6	VLVH	ACID TITRATION
L004	36.00	6.000	9	VLVH VHVH VL	10110L
L014	49.50	6.188	8	VHVH	METROHN
L018	58.00	6.444	9		GRAN ANALY. TITRAT.
L019	18.00	4.500	4	VHVH	GRAN ANALY. TITRAT.
L020	71.50	8.938	8		GRAN-PLT. TITRATION TO PH 4.
L027	34.50	4.313	9		POTENTIOMETRIC
L032	35.50	4.500	8		COMPUTERIZED TITRA
L053	72.50	8.069	9		GRAN TITRA.
L058	50.00	5.556	9		
OVERALL AVERAGE RANK IS		5.863			

84/03/27

PARAMETER: 01092 PH

PH UNITS

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0000 BASIC ACCEPTABLE ERROR= .2500 CONCENTRATION ERROR INCREMENT= 0.0000
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
RANK	RANK	RANK	RANK	RANK	RANK	RANK
L003	5.5	6.5 H	7.0	4.2 VL	4.4	8.2
L004	5.3	5.8 VL	5.8 VL	3.5 VL	4.4	6.6 VL
L006	5.22	13.00	6.66	4.1	4.2	7.0
L007	5.33	25.00	7.08 H	4.31	4.38	8.0
L009	5.50 VL	32.50	6.91	4.24	4.44	8.32 H
L010	4.57	31.00	6.45 L	4.0	4.40	8.14
L011	5.57	36.00	6.95	4.40	4.40 VL	7.9
L012	5.08	18.00	6.63	4.21	4.45	7.95
L013	5.38	32.50	6.67	4.3	4.4	8.01
L014	5.32	32.00	6.56	4.02	4.12 L	8.12
L016	4.31 VL	4.00	6.40 VL	4.00	4.30	7.70 L
L018	5.33	19.00	6.19 VL	4.00	4.32	7.73
L020	5.33	21.00	6.857	4.35	4.32	8.07
L022	5.35	23.00	7.0	4.4	4.41	8.0
L023	5.35	23.00	6.93	4.14	4.22	8.22
L025	5.35	23.00	6.93	4.0	4.25	8.15
L027	5.39 VL	0.00	7.80 VH	4.38 VH	4.5	8.12 VH
L028	5.77	38.00	6.93	4.38	4.27	8.00
L029	5.47	38.00	6.79	4.28	4.41	8.07
L030	5.31	19.50	6.72	4.33	4.39	8.17
L031A	5.23	14.00	6.72	4.34	4.40	8.06
L032	5.047 L	0.00	6.987	4.276	4.471	8.243
L033	5.1	5.00	6.7	4.2	4.39	8.2
L045	5.13	3.00	6.48 L	4.15	4.49	8.20
L046	5.13	5.00	6.48	4.01	4.49	8.20
L048	5.13	9.00	6.33 VL	3.73 VL	4.37	7.93
L049	5.33	10.00	6.33	4.25	4.37	7.90
L050	5.08	10.50	6.66	4.15	4.30	7.98
L051	5.24	12.00	6.64	4.34	4.40	8.06
L052	5.40	13.00	6.83	4.26	4.40	8.10
L053	5.40	22.00	6.75	4.30	4.26	7.92
L054	5.25	15.50	6.65	4.30	4.30	7.80
L061	5.3	0.00	6.6	4.38	4.46	7.7 L
L062	5.25	17.50	6.3	5.1 VH	4.3	7.7
L064	5.25	35.00	6.64	4.2	4.39	7.80
L066	5.49	30.00	6.77	5.05 VH	4.37	7.97
MEAN	5.320	6.240	6.755	4.250	4.390	8.000

84/03/27

PARAMETER: 01J92 PH

PH UNITS

SAMPLE LAB NO	8			9			10		
	REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK	
L002	5.7	19.50		7.9	34.00		5.5	21.50	
L003	5.8	31.50		6.3	VL		5.6	31.00	
L004	5.3	VL		7.0	VL		5.2	4.50	
L005	5.7	20.50		7.47	7.00		5.55	29.00	
L006	5.71	22.00		8.00	H		5.41	21.50	
L009	5.72	23.00		7.86	31.00		5.50	21.50	
L010	5.2	VL		7.6	12.00		5.4	19.50	
L011	5.78	30.00		7.71	16.50		5.49	19.50	
L012	5.72	22.50		7.61	13.50		5.53	26.50	
L013	5.2	VL		7.6	13.50		5.6	31.00	
L014	5.15	VL		7.94	36.00		5.72	31.00	
L016	5.45	L		7.50	9.50		5.60	31.00	
L018	5.33	VL		7.29	VL		5.25	16.00	
L019	5.63	14.50		7.80	29.00		5.44	18.00	
L020	5.73	35.50		7.84	29.00		5.49	19.50	
L021	5.9	33.50		7.9	34.00		4.5	VL	
L022	5.99	H		8.04	H		5.95	36.00	
L023	5.00	35.00		7.85	30.00		5.70	34.00	
L024	5.7	36.50		7.9	34.00		5.4	9.50	
L025	7.01	VL		9.20	VH		6.12	37.00	
L027	6.72	VH		7.72	40.00		6.28	39.00	
L029	5.68	39.00		7.81	22.00		5.65	33.00	
L030	5.63	17.50		7.72	22.00		5.41	13.50	
L031A	5.74	14.50		7.88	32.00		5.53	26.50	
L031B	5.74	18.50		7.88	32.00		5.53	0.00	
L032	5.738	27.00		7.956	37.00		5.535	28.00	
L033	5.3	VL		7.8	25.00		5.1	VL	
L042	5.73	45.50		7.83	25.00		5.51	23.00	
L045	5.43	29.00		7.38	L		5.14	3.00	
L046	5.69	17.50		7.70	17.50		5.52	24.50	
L048	5.40	L		7.49	17.50		5.40	9.50	
L049	5.5	12.50		7.5	9.50		5.4	9.50	
L053	5.54	11.00		7.72	22.00		5.46	17.00	
L057	5.50	11.00		7.69	16.00		5.48	16.00	
L05A	5.73	VL		7.70	15.00		5.43	15.00	
L060	5.30	VL		7.68	15.00		5.20	L	
L061	5.30	VL		7.45	0.00		5.20	0.00	
L062	5.9	31.50		7.3	VL		6.3	VH	
L063	7.1	33.50		7.8	4.00		9.3	VH	
L064	5.72	41.00		7.60	25.00		5.49	40.00	
L066	5.00	33.50		7.67	12.00		5.52	9.50	
MEDIAN					14.00			24.50	
CONC.	5.710			7.715			5.495		

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L002	245.50	27.278	9	H	BIASED LOW
L003	111.00	13.875	8	VLVLVLVL	
L004	160.00	16.667	9	VLVLVLVL	
L005	148.00	18.500	8	HHH	
L006	240.50	30.063	8		BIASED LOW
L007	217.00	27.125	8	VLLVLVL	
L010	46.50	5.813	8		
L011	18.50	27.313	8		
L012	180.50	22.056	9		BIASED LOW
L013	171.50	21.438	8	LVL	
L014	181.50	22.688	8	VLLVLVLVL	
L016	173.00	21.625	9	VLLVLVLVL	
L018	42.00	4.667	9		BIASED LOW
L019	181.50	22.693	9		
L020	214.50	26.938	8	HVL	
L021	247.00	27.444	9	HHHVL	
L022	233.50	29.813	8	H	BIASED LOW
L023	238.50	29.813	8		
L024	190.50	23.813	8	VLVHVHVHVHVH	
L025	241.00	30.125	8	VHVHVHVH	
L027	225.50	28.389	9	H	INSUFFICIENT DATA
L029	159.00	17.667	9		
L030	198.00	22.111	9		
L031	234.00	29.250	8	VLVL	
L032	153.00	19.111	8	VLLVL	BIASED LOW
L033	123.00	15.375	8	VLL	
L034	129.00	16.125	8	VH	
L035	122.00	15.250	8		
L036	124.00	15.500	8		INSUFFICIENT DATA
L037	124.00	15.500	8		
L038	124.00	15.500	8		
L039	124.00	15.500	8		
L040	124.00	15.500	8		BIASED LOW
L041	124.00	15.500	8		
L042	124.00	15.500	8		
L043	124.00	15.500	8		
L044	124.00	15.500	8		INSUFFICIENT DATA
L045	124.00	15.500	8		
L046	124.00	15.500	8		
L047	124.00	15.500	8		
L048	124.00	15.500	8		BIASED LOW
L049	124.00	15.500	8		
L050	124.00	15.500	8		
L051	124.00	15.500	8		
L052	124.00	15.500	8		BIASED LOW
L053	124.00	15.500	8		
L054	124.00	15.500	8		
L055	124.00	15.500	8		
L056	124.00	15.500	8		BIASED LOW
L057	124.00	15.500	8		
L058	124.00	15.500	8		
L059	124.00	15.500	8		
L060	124.00	15.500	8		BIASED LOW
L061	124.00	15.500	8		
L062	124.00	15.500	8		
L063	124.00	15.500	8		
L064	124.00	15.500	8		BIASED LOW
L065	124.00	15.500	8		
L066	124.00	15.500	8		
L067	124.00	15.500	8		
L068	124.00	15.500	8		BIASED LOW
L069	124.00	15.500	8		
L070	124.00	15.500	8		
L071	124.00	15.500	8		
L072	124.00	15.500	8		BIASED LOW
L073	124.00	15.500	8		
L074	124.00	15.500	8		
L075	124.00	15.500	8		
L076	124.00	15.500	8		BIASED LOW
L077	124.00	15.500	8		
L078	124.00	15.500	8		
L079	124.00	15.500	8		
L080	124.00	15.500	8		BIASED LOW
L081	124.00	15.500	8		
L082	124.00	15.500	8		
L083	124.00	15.500	8		
L084	124.00	15.500	8		BIASED LOW
L085	124.00	15.500	8		
L086	124.00	15.500	8		
L087	124.00	15.500	8		
L088	124.00	15.500	8		BIASED LOW
L089	124.00	15.500	8		
L090	124.00	15.500	8		
L091	124.00	15.500	8		
L092	124.00	15.500	8		BIASED LOW
L093	124.00	15.500	8		
L094	124.00	15.500	8		
L095	124.00	15.500	8		
L096	124.00	15.500	8		BIASED LOW
L097	124.00	15.500	8		
L098	124.00	15.500	8		
L099	124.00	15.500	8		
L100	124.00	15.500	8		BIASED LOW
L101	124.00	15.500	8		
L102	124.00	15.500	8		
L103	124.00	15.500	8		
L104	124.00	15.500	8		BIASED LOW
L105	124.00	15.500	8		
L106	124.00	15.500	8		
L107	124.00	15.500	8		
L108	124.00	15.500	8		BIASED LOW
L109	124.00	15.500	8		
L110	124.00	15.500	8		
L111	124.00	15.500	8		
L112	124.00	15.500	8		BIASED LOW
L113	124.00	15.500	8		
L114	124.00	15.500	8		
L115	124.00	15.500	8		
L116	124.00	15.500	8		BIASED LOW
L117	124.00	15.500	8		
L118	124.00	15.500	8		
L119	124.00	15.500	8		
L120	124.00	15.500	8		BIASED LOW
L121	124.00	15.500	8		
L122	124.00	15.500	8		
L123	124.00	15.500	8		
L124	124.00	15.500	8		BIASED LOW
L125	124.00	15.500	8		
L126	124.00	15.500	8		
L127	124.00	15.500	8		
L128	124.00	15.500	8		BIASED LOW
L129	124.00	15.500	8		
L130	124.00	15.500	8		
L131	124.00	15.500	8		
L132	124.00	15.500	8		BIASED LOW
L133	124.00	15.500	8		
L134	124.00	15.500	8		
L135	124.00	15.500	8		
L136	124.00	15.500	8		BIASED LOW
L137	124.00	15.500	8		
L138	124.00	15.500	8		
L139	124.00	15.500	8		
L140	124.00	15.500	8		BIASED LOW
L141	124.00	15.500	8		
L142	124.00	15.500	8		
L143	124.00	15.500	8		
L144	124.00	15.500	8		BIASED LOW
L145	124.00	15.500	8		
L146	124.00	15.500	8		
L147	124.00	15.500	8		
L148	124.00	15.500	8		BIASED LOW
L149	124.00	15.500	8		
L150	124.00	15.500	8		
L151	124.00	15.500	8		
L152	124.00	15.500	8		BIASED LOW
L153	124.00	15.500	8		
L154	124.00	15.500	8		
L155	124.00	15.500	8		
L156	124.00	15.500	8		BIASED LOW
L157	124.00	15.500	8		
L158	124.00	15.500	8		
L159	124.00	15.500	8		
L160	124.00	15.500	8		BIASED LOW
L161	124.00	15.500	8		
L162	124.00	15.500	8		
L163	124.00	15.500	8		
L164	124.00	15.500	8		BIASED LOW
L165	124.00	15.500	8		
L166	124.00	15.500	8		
L167	124.00	15.500	8		
L168	124.00	15.500	8		BIASED LOW
L169	124.00	15.500	8		
L170	124.00	15.500	8		
L171	124.00	15.500	8		
L172	124.00	15.500	8		BIASED LOW
L173	124.00	15.500	8		
L174	124.00	15.500	8		
L175	124.00	15.500	8		
L176	124.00	15.500	8		BIASED LOW
L177	124.00	15.500	8		
L178	124.00	15.500	8		
L179	124.00	15.500	8		
L180	124.00	15.500	8		BIASED LOW
L181	124.00	15.500	8		
L182	124.00	15.500	8		
L183	124.00	15.500	8		
L184	124.00	15.500	8		BIASED LOW
L185	124.00	15.500	8		
L186	124.00	15.500	8		
L187	124.00	15.500	8		
L188	124.00	15.500	8		BIASED LOW
L189	124.00	15.500	8		
L190	124.00	15.500	8		
L191	124.00	15.500	8		
L192	124.00	15.500	8		BIASED LOW
L193	124.00	15.500	8		
L194	124.00	15.500	8		
L195	124.00	15.500	8		
L196	124.00	15.500	8		BIASED LOW
L197	124.00	15.500	8		
L198	124.00	15.500	8		
L199	124.00	15.500	8		
L200	124.00	15.500	8		BIASED LOW
L201	124.00	15.500	8		
L202	124.00	15.500	8		
L203	124.00	15.500	8		
L204	124.00	15.500	8		BIASED LOW
L205	124.00	15.500	8		
L206	124.00	15.500	8		
L207	124.00	15.500	8		
L208	124.00	15.500	8		BIASED LOW
L209	124.00	15.500	8		
L210	124.00	15.500	8		
L211	124.00	15.500	8		
L212	124.00	15.500	8		BIASED LOW
L213	124.00	15.500	8		
L214	124.00	15.500	8		
L215	124.00	15.500	8		
L216	124.00	15.500	8		BIASED LOW
L217	124.00	15.500	8		
L218	124.00	15.500	8		
L219	124.00	15.500	8		
L220	124.00	15.500	8		BIASED LOW
L221	124.00	15.500	8		
L222	124.00	15.500	8		
L223	124.00	15.500	8		
L224	124.00	15.500	8		BIASED LOW
L225	124.00	15.500	8		
L226	124.00	15.500	8		
L227	124.00	15.500	8		
L228	124.00	15.500	8		BIASED LOW
L229	124.00	15.500	8		
L230	124.00	15.500	8		
L231	124.00	15.500	8		
L232	124.00	15.500	8		BIASED LOW
L233	124.00	15.500	8		
L234	124.00	15.500	8		
L235	124.00	15.500	8		
L236	124.00	15.500	8		BIASED LOW
L237	124.00	15.500	8		
L238	124.00	15.500	8		
L239	124.00	15.500	8		
L240	124.00	15.500	8		BIASED LOW
L241	124.00	15.500	8		
L242	124.00	15.500	8		
L243	124.00	15.500	8		
L244	124.00	15.500	8		BIASED LOW
L245	124.00	15.500	8		
L246	124.00	15.500	8		
L247	124.00	15.500	8		
L248	124.00	15.500	8		BIASED LOW
L249	124.00	15.500	8		
L250	124.00	15.500	8		
L251	124.00	15.500	8		
L252	124.00	15.500	8		BIASED LOW
L253	124.00	15.500	8		
L254	124.00	15.500	8		
L255	124.00	15.500	8		
L256	124.00	15.500	8		BIASED LOW
L257	124.00	15.500	8		
L258	124.00	15.500	8		
L259	124.00	15.500	8		
L260	124.00	15.500	8		BIASED LOW
L261	124.00	15.500	8		
L262	124.00	15.500	8		
L263	124.00	15.500	8		
L264	124.00	15.500	8		BIASED LOW
L265	124.00	15.500	8		
L266	124.00	15.500	8		
L267	124.00	15.500	8		
L268	124.00				

LAB NO.	TOTAL AVRAGE RANK	NO. OF RANKED SAMPLES	FLUORESCENCE RANKING	BIASED LOW BIASED LOW BIASED LOW BIASED LOW	METHOD CODING
L018	42.00	9	VLLVLLVLL	PH METER	ELECTROMETRIC POTENTIOMETRIC 10301L
L045	43.50	9	LLLL	ELECTROMETRIC	
L010	46.50	3	VLLVLL	POTENTIOMETRIC	
L004	60.00	9	VLLVLLVLL	10301L	
L016	79.00	9	VLLVLL	ELECTRODE	ELECTRODE ELECTRODE PH METER
L048	92.50	9	VLL	ELECTRODE	
L050	100.00	9	VLL	ELECTRODE	
L020	112.00	9	VH	PH METER	
L043	113.75	9	VLLVLLVLL	PH METER	CORNING M. 135 PH METER
L003	114.00	9	VL	PH METER	
L046	128.50	9	VL	PH METER	
L064	129.00	9	VL	PH METER	
L058	133.50	9	VL	PH METER	AUTOMATED PROBE PH METER ELECTROMETRIC POTENTIOMETRIC ELECTRODE
L033	136.00	9	VLLVLL	ELECTRODE	
L006	143.00	8	VHLVLLVH	ELECTRODE	
L062	167.00	9	VHLVLLVH	ELECTRODE	
L012	180.50	9	VH	METER	PH METER ELECTROMETRIC GLASS ELECTROMETER
L019	181.50	9	VH	METER	
L030	183.00	9	VH	METER	
L013	171.50	8	VH	METER	
L057	177.00	8	VH	METER	ELECTROMETRIC INGOLD ELECTRODE RESINES ELECTRODE
L014	181.50	8	VH	METER	
L023	200.00	9	VH	METER	
L066	210.50	9	VH	METER	
L024	210.50	8	VH	METER	ELECTROMETRIC INGOLD ELECTRODE RESINES ELECTRODE
L031	219.00	9	VH	METER	
L063	222.50	9	VH	METER	
L020	225.50	8	VH	METER	
L009	227.00	8	VH	METER	ELECTROMETRIC INGOLD ELECTRODE RESINES ELECTRODE
L002	227.50	9	VH	METER	
L011	228.50	8	VH	METER	
L021	229.00	9	VH	METER	
L042	229.50	9	VH	METER	ELECTROMETRIC INGOLD ELECTRODE RESINES ELECTRODE
L029	230.50	9	VH	METER	
L022	231.50	8	VH	METER	
L032	232.50	8	VH	METER	
L022	233.50	8	VH	METER	ELECTROMETRIC INGOLD ELECTRODE RESINES ELECTRODE
L007	234.50	8	VH	METER	
L025	235.50	8	VH	METER	
L027	236.50	8	VH	METER	
L061	237.50	3	VH	METER	ELECTROMETRIC INGOLD ELECTRODE RESINES ELECTRODE

84/03/27

PARAMETER: 00392 SPECIFIC CONDUCTANCE

UMHO/CM

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 50.0000 BASIC ACCEPTABLE ERROR= 2.0000 CONCENTRATION ERROR INCREMENT= .0000
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1			2			3			5			6			7		
	REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK		REPORTED VALUE	RANK	
L002	29.4	16.50		28.4	17.00		22.8	23.00		38.7 H	28.00		38.8	30.50		229.0	29.50	
L003	31.	23.50			0.00		22.	12.50		35. VH	35.00		35. VH	35.00		229.	15.00	
L004	30.7	23.50		28.	13.50		23.	25.50		37.3	35.00		35.8	35.00		229.	15.00	
L006	30.7	19.00			0.00		23.7	32.00		34.0 VH	33.00		35.8	35.00		229.	15.00	
L007	31.0	28.50			0.00		20.4	14.50		35.8	33.00		35.5	35.00		229.	15.00	
L010	31.0	28.50			0.00		22.5	31.50		33.8	33.00		33.8	35.00		229.	15.00	
L011	31.1	23.50			0.00		22.6	21.50		34.0 VL	33.00		33.7	35.00		229.	15.00	
L013	31.1	23.50			0.00		20.3	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L014	31.7	12.50		25.0	3.50		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L018	31.7	12.50		27.2	16.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L021	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L022	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L023	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L024	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L027	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L029	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L030	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L031	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L032	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L033	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L042	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L043	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L046	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L048	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L049	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L057	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L059	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L061	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L062	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L063	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L064	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
L066	31.7	12.50			0.00		23.1	15.50		35.0	33.00		35.0	35.00		229.	15.00	
MEDIAN	29.600			27.600			22.400			35.650			36.450			222.000		

84/03/27

PARAMETER: 00392 SPECIFIC CONDUCTANCE UNIT: CM

SAMPLE LAB NO	8		9		10	
	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	8.41	26.00	95.7	18.00	457.0	29.50
L003	7.8	10.00	95.0	12.50	440.0	12.50
L004	7.3	15.50	95.0	16.50	435.0	9.00
L005	7.3	12.00	95.0	32.00	450.0	22.50
L007	9.0	29.50	95.0	8.50	459.0	29.00
L009	9.0	29.50	95.0	29.50	445.0	17.00
L010	9.0	18.00	95.0	27.50	442.0	15.00
L011	8.00	32.50	95.0	21.50	440.0	16.00
L013	8.3	35.00	95.0	8.50	420.0	4.00
L014	29.00	37.50	95.0	20.00	439.0	11.00
L018	7.7	9.00	95.0	18.50	447.0	19.50
L019	7.7	27.00	95.0	10.00	452.0	25.00
L021	7.7	35.00	95.0	4.50	413.0	3.00
L022	10.4	33.00	95.0	14.00	430.0	6.00
L023	8.2	20.50	95.0	26.00	441.0	14.00
L024	8.0	16.00	95.0	13.00	435.0	19.00
L025	8.78	28.00	95.0	23.00	455.0	26.50
L027	7.9	12.00	95.0	17.00	450.0	22.50
L029	8.17	19.00	95.0	17.00	450.0	22.50
L030	8.17	19.00	95.0	17.00	450.0	22.50
L031A	6.8	4.00	95.0	26.00	446.0	18.00
L032	6.4	24.50	95.0	34.00	470.0	34.00
L033	6.4	24.50	95.0	29.50	461.0	31.50
L042	10.91	32.00	270.0	35.00	1300.0	35.00
L045	10.4	14.00	95.0	24.00	435.0	9.00
L046	8.4	10.00	95.0	2.00	335.0	2.00
L048	8.4	24.50	95.0	31.00	461.0	31.50
L049	8.2	16.00	95.0	4.50	280.0	1.00
L057	3.1	20.50	95.0	18.50	455.0	26.50
L058	3.1	16.00	95.0	15.50	440.0	12.50
L060	3.1	1.00	95.0	0.00	450.0	22.50
L061	7.4	7.50	95.0	0.00	450.0	22.50
L062	6.4	2.50	95.0	11.00	457.0	29.00
L063	12.4	34.50	95.0	33.00	447.0	19.50
L064	7.90	12.00	95.0	15.50	433.0	17.00
MEAN	8.100		94.000	1.00	446.000	33.00

LAB NO.	TOTAL RANK	NO OF SAMPLES RANKED	SUMMARY OF PLACING	AVERAGE RANK	METHOD CODING
L003	23.50	9	H	25.278	02041L
L004	151.50	9	VHVH	12.433	
L006	202.50	9	VH	25.313	
L007	159.50	9	VH	18.938	
L009	103.00	9	VH	12.875	
L010	171.00	9	L	21.372	RADIOMETER
L011	153.00	9	VLVLVH	20.872	TEMP. COMPEN. CELL
L012	195.00	9	VLVLVH	21.875	METER
L018	98.50	9	LLL	10.667	CONDUCT BRIDGE
L019	134.50	9	LLL	14.944	CONDUCTIVITY METRE
L021	162.50	9	LLL	18.200	CONDUCTIVITY CELL
L022	130.50	9	VH	5.625	ELECTROMETRIC
L024	176.00	9	VH	16.313	METER
L025	127.00	9	VH	22.000	FLOW THROUGH CELL
L027	237.00	9	VH	26.333	METER
L029	171.50	9	VH	19.833	METER
L030	166.00	9	VH	18.444	CONDUCTIVITY METER
L031A	107.50	9	VH	33.438	CONDUCTIVITY METRE
L032	253.50	9	VH	31.938	RADIOMETER
L033	145.00	9	VH	16.111	COND METER
L042	300.00	9	VH	33.333	HACH METER
L045	140.50	9	VH	15.611	METER
L046	44.00	9	VH	5.500	METER
L048	249.50	9	VH	27.722	METER
L049	137.00	9	VH	15.222	METER
L057	178.00	9	VH	19.778	METER
L058	172.50	9	VH	19.167	METER
L060	43.50	9	VH	4.833	DIONEX, LC, DETECT
L061	24.50	9	VH	8.167	BRIDGE A CELL
L062	103.50	9	VH	11.500	AUTOMATED PROBE
L063	208.50	9	VH	23.167	AUTO
L064	136.00	9	VH	15.333	COND. METER
L066	111.00	9	VH	12.333	COND. METER
OVERALL AVERAGE				17.634	
RANK IS					

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF RANKED SAMPLES	SUMMARY OF FLAGGING	METHOD CODING
L060	43.50	4.833	9	VLVLVLLVLLVL	DIONEX, IC, DETECT
L046	44.00	5.000	8	VLVLVLLVLLVL	CONDUCTIVITY CELL
L022	45.00	5.625	8	LLL	BIASED LOW
L061	24.50	8.167	3		BIASED LOW
L018	95.00	10.667	9		BIASED LOW
L062	103.50	11.500	9	VLVL	INSUFFICIENT DATA
L014	95.00	11.675	8	VLVLVH	CONDUCT BRIDGE
L066	111.00	12.333	9	VLVL	AUTOMATED PROBE
L003	99.50	12.438	8	VH	METER
L009	103.00	12.875	8		COND. METER
L031A	107.50	13.438	8		
L019	134.50	14.944	9	VHVHLLVL	CONDUCTIVITY METRE
L049	137.00	15.222	9		CONDUCTIVITY METER
L064	138.00	15.333	9		
L025	124.00	15.500	8		FLOW THROUGH CELL
L045	140.50	15.611	9	VL	HACH METER
L033	145.00	16.111	9		COND. METER
L023	150.50	16.333	8	VHVH	CONDUCTOMETRIC
L004	150.50	16.722	9		02041C
L020	166.50	18.500	9		CONDUCTIVITY METER
L021	172.50	19.167	9	VH	
L058	175.00	19.375	8	L	
L011	178.00	19.750	8		
L027	178.00	19.750	8		
L007	159.50	19.938	8		TEMP. COMPEN. CELL
L013	177.00	20.875	8		RADIO METER
L010	176.00	21.000	8		METER
L024	209.50	23.000	9	VHVHVLVLH	AUTO
L063	209.50	23.167	9	H	
L002	217.50	25.375	9		
L006	202.50	25.313	8	VH	METER
L027	237.00	26.333	9	H	METER
L048	249.50	27.022	9	VHH	RADIO METER
L032	255.50	31.938	8	VHVHVHVHVHVHVH	
L042	300.00	33.333	9		BIASED HIGH
OVERALL AVERAGE RANK IS		17.634			BIASED HIGH

84/03/27.

04/03/27

PARAMETER: 00292 COLOUR

HAZEN UNIT

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 5.0000 BASIC ACCEPTABLE ERROR= 2.6000 CONCENTRATION ERROR INCREMENT= .2000
 LABORATORY: SYE TO REPORT: L001, L015, L017, L043, L045, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
RANK	RANK	RANK	RANK	RANK	RANK	RANK
L002	20.50	40.	10.	5.	5.	5.
L003	10.50	0.00	7.00	7.50	7.50	7.50
L004	16.50	7.50	16.00	0.00	0.00	0.00
L010	10.50	0.00	23. VH	16. VH	12. VH	13. VH
L011	14.00	0.00	15. H	13.00	10.00	10.00
L022	17.00	0.00	13.00	5.00	7.50	7.50
L023	10.50	0.00	11.00	5.00	2.00	2.00
L027	16.50	0.00	13.00	5.00	5.00	5.00
L030	13.00	48.3 H	12.00	10.00	3.00	3.00
L031A	13.00	42.	13.00	1.00	7.40 VH	7.00
L032	10.50	0.00	13.00	0.00	1.00	0.00
L042	11.5	30.0	10.0	5.5	2.00	2.00
L043	13.00	35.	7.00	5.00	0.50	0.50
L049	13.00	30. H	10.00	5.00	2.50	2.50
L057	18.00	50. H	16.00	5.00	5.00	5.00
L059	4.50	20. VL	10.00	5.00	5.00	5.00
L063	1.00	0.00	2.50	0.00	2.50	2.50
CONC.	20.000	37.500	10.000	5.000	2.500	2.520

SAMPLE LAB NO	8	9	10
REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
RANK	RANK	RANK	RANK
L002	5.	5.	5.
L003	15.	15.	15.
L004	0.00	0.00	0.00
L010	13. VH	13. VH	13. VH
L011	7.50 VH	7.50 VH	7.50 VH
L022	2.00	2.00	2.00
L023	2.00	2.00	2.00
L024	1.63	1.63	1.63
L030	1.00	1.00	1.00
L031A	1.00	1.00	1.00
L032	0.50	0.50	0.50
L045	2.50	2.50	2.50
L049	5.00	5.00	5.00
L057	5.00	5.00	5.00
L059	2.50	2.50	2.50
L063	0.00	0.00	0.00
CONC.	2.000	2.500	2.500

LAB NO. TOTAL AVERAGE NO. OF SAMPLES SUMMARY OF
RANK RANK RANKED FLAGGING

METHOD CODING

L002	64.50	8.063	8	VLL	INSUFFICIENT DATA	02011L
L003	36.50	2.250	2	VHV HV HVHVHVHVH	INSUFFICIENT DATA	PT.CO VIS COMPAR
L004	17.50	10.722	2	H	INSUFFICIENT DATA	COLORIMETRIC
L010	43.50	18.750	2	HVVH	INSUFFICIENT DATA	VISUAL COMPARISON
L022	23.50	12.625	2	H	INSUFFICIENT DATA	KLETT SUMMERSON
L023	23.50	1.125	2	HVVH	INSUFFICIENT DATA	COLORIMETRIC
L024	65.50	8.125	2	HVVH	INSUFFICIENT DATA	TECHNICON
L027	93.50	1.167	2	H	INSUFFICIENT DATA	COMPAROMETER
L030	24.50	4.083	3	L	INSUFFICIENT DATA	VISUAL COMP.
L031A	40.00	5.000	3	L	INSUFFICIENT DATA	COLOUR DISC
L032	31.00	5.667	3	L	INSUFFICIENT DATA	HELLIGE
L045	16.50	5.500	3	L	INSUFFICIENT DATA	
L046	8.50	2.833	3	VHVHVH	INSUFFICIENT DATA	
L049	92.00	10.222	3	VLVLL VL	BIASED LOW	
L057	27.50	5.500	3			
L058	13.00	1.444	3			
OVERALL AVERAGE RANK IS	7.018					

LAB NO. TOTAL AVERAGE NO. OF SAMPLES SUMMARY OF
RANK RANK RANKED FLAGGING

METHOD CODING

L063	13.00	1.444	3	VLVLL VL	BIASED LOW	HELLIGE
L003	14.50	2.250	2	VLL	INSUFFICIENT DATA	COLOUR DISC
L009	9.50	2.833	3	L	INSUFFICIENT DATA	TECHNICON
L031A	26.50	5.083	3	L	INSUFFICIENT DATA	COMPAROMETER
L032	26.50	5.000	3		INSUFFICIENT DATA	COMPARATOR
L038	27.50	5.500	3		INSUFFICIENT DATA	COLORIMETRIC
L045	16.50	2.225	3		INSUFFICIENT DATA	VISUAL COMP.
L049	15.00	5.000	3			
L057	21.00	5.667	3	HVVH	INSUFFICIENT DATA	KLETT SUMMERSON
L062	64.50	8.125	3	VHVH	INSUFFICIENT DATA	KLETT SUMMERSON
L024	33.00	8.125	3	VHVH	INSUFFICIENT DATA	PT.CO VIS COMPAR
L010	65.50	8.125	3	VHVH	INSUFFICIENT DATA	
L057	92.00	10.222	3	VHVH	INSUFFICIENT DATA	
L011	83.50	10.833	3	VHVH	INSUFFICIENT DATA	
L004	96.50	10.722	3	H	INSUFFICIENT DATA	02011L
L030	33.50	11.167	3	H	INSUFFICIENT DATA	COLORIMETRIC
L023	23.50	11.750	2	H	INSUFFICIENT DATA	VISUAL COMPARISON
OVERALL AVERAGE RANK IS	7.018					

84/03/27

PARAMETER: 14092 REACTIVE SILICA

MG SI/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .1000 BASIC ACCEPTABLE ERROR= .0500 CONCENTRATION ERROR INCREMENT= .0000
 LABORATORIES YET TO REPORT: L001L, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK	RANK	RANK	RANK
L002	.36	2.73	2.58	.028	.079	.53
L003	.32		3.1 H	.05M		.65 H
L006	.35		2.56	.03		.45 L
L010	.40		2.8	.04 T		.60
L014	.398		2.91	.045		.562
L020	.4		2.8	.05 T		.6
L023	.42		2.90	.1M		.56
L024	.4		2.9	.03 T		.5
L027	.334	2.78	2.61	.05 T	.08 T	.51
L031A	.40	2.84	2.65	.012	.06 T	.505
L032	.507 H		2.85	.05	.10	.58
L033	.37	2.8	3.08 H	.0414	.083	.5675
L046	.07 VL		2.7	.23M	.23M	.51
L048	.39	3.45 VL	2.6	.05	.08	.53
L049	.64 VH		1.99 VL	.01M	.01M VL	.53
L060	.42	4.90 VH	2.86 VH	.05	.09	.56
L062	.37	2.90	4.60 VH	.07	.16 H	.92 VH
L063	1.2M	6.4 VH	2.5	.03	.10	.68 H
MEDIAN			5.8 VH	1.2M	1.2M	1.2M
CONC.	.398	2.800	2.800	.041	.087	.560

SAMPLE LAB NO	8	9	10
	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
	RANK	RANK	RANK
L002	.028	1.05	.01
L003	.05M	1.2	.05M
L006	.03 T	1.01	
L010	.04	1.1	.01 T
L020	.05 T	1.1	L
L023	.1M	1.17	.25M
L024	.03 T	1.1	.14
L027	.02M	1.1	.03M
L029	.05	1.04	.03M
L031A	.0553	1.14	.01M
L032	.031	1.06	.015
L033	.05	1.08	.23M
L046	.03	1.05	.01M
L048	.03	1.02 VH	.01M
L049	.03	1.08	.01M
L060	.03	1.08	.01M
L062	1.2M	2.3 VH	.04 T
MEDIAN	.030	1.100	.010

LAB NO. TOTAL AVERAGE NO. OF SAMPLES SUMMARY OF
RANK RANK RANKED FLAGGING

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L002	33.00	4.333	9	HH	TECHNICON
L003	30.00	16.000	2	L	TECHNICON
L006	29.00	16.143	7		AUTO ANALYZER
L010	31.50	10.188	8		ICAP-EXTRACT
L014	32.00	11.714	7		AUTO-MOLY-BLUE
L020	32.20	11.357	7		AUTO-MOLY-BLUE
L023	35.00	16.000	5		MOLYB-ASCO RB
L027	43.00	5.000	7		AUTO-MOLY-SILICATE
L029	38.00	5.429	7		COLORIMETRIC
L031A	34.00	13.778	9		COLORIMETRIC
L032	35.00	13.357	7	HH	TECHNICON
L033	100.00	12.500	8		AUTO HET-POLY BLUE
L045	35.00	7.000	5		AUTO COLOR
L046	35.00	6.688	8	VLVLVLVL	AUTOMATED-ASCO RB
L048	20.50	2.563	8		AUTOMATED-ASCO RB
L049	34.00	11.750	8	H	TECHNICON
L060	135.00	16.875	8	VHVHVHVHVH	TECHNICON
L062	83.50	11.063	8	H	COLOUR
L063	43.00	4.778	9	L	COLOURIMETRIC
L063	51.00	17.000	3	VHVHVH	TECHNICON
L063	51.00	17.000	3		AUTO M004
OVERALL AVERAGE		9.147			
RANK IS					

LAB NO. TOTAL AVERAGE NO. OF SAMPLES SUMMARY OF
RANK RANK RANKED FLAGGING

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L046	20.50	2.563	8	VLVLVLVL	AUTOMATED-ASCO RB
L029	34.00	3.778	9		AUTOMATED-ASCO RB
L002	29.00	16.143	7	L	AUTO ANALYZER
L002	29.00	16.143	7		TECHNICON
L027	43.00	5.429	7	L	TECHNICON
L029	38.00	5.429	7		TECHNICON
L033	35.00	7.000	5		COLORIMETRIC
L033	35.00	7.000	5		AUTOMATED-ASCO RB
L034	43.00	4.778	9		AUTO COLOR
L034	43.00	4.778	9		COLORIMETRIC
L034	43.00	4.778	9		ICAP-EXTRACT
L034	43.00	4.778	9		TECHNICON
L034	43.00	4.778	9		AUTO-MOLY-BLUE
L034	43.00	4.778	9		TECHNICON
L034	43.00	4.778	9		MOLYB-ASCO RB
L034	43.00	4.778	9		AUTO HET-POLY BLUE
L034	43.00	4.778	9		TECHNICON
L034	43.00	4.778	9		AUTO-MOLY-SILICATE
L034	43.00	4.778	9		TECHNICON
L034	43.00	4.778	9		COLOUR
L034	43.00	4.778	9		AUTO M004
OVERALL AVERAGE		9.147			
RANK IS					

PARAMETER: 07092 NITRATE + NITRITE MG N/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRIAP INTERLAB STUDY NO. L5: MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .5000 BASIC ACCEPTABLE ERROR= .0250 CONCENTRATION ERROR INCREMENT= .2000
 LABORATORIES YET TO REPORT: L001, L015, L017, L040, L043, L051, L054, L056
 LABORATORY RESULTS OMITTED ARE NONE

SAMPLE LAB NO	1	2	3	5	6	7
	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	.008	11.00	.093	16.50	.997 VH	36.00
L003	.005H	10.00	.10	21.50	.40 VL	30.00
L004	.01	16.50	.09	8.00	.79	40.00
L006	.01	22.50	.09	8.00	.51 VH	12.50
L007	.06 VH	33.00	.16 VH	31.50	.79	32.50
L009	.036 H	25.00	.42	35.00	3.79 VH	26.50
L010	.01	22.50	.12 VH	27.50	1.95 VH	33.00
L011	.031	11.00	.13	27.50	.79	32.50
L013	.043 H	21.00	.093	16.50	.306 VL	23.50
L014	.002	3.50	.109	18.00	.726	33.00
L019	.017	8.00	.109	18.00	.428	13.00
L020	.047 H	26.00	.15 VH	34.00	.45	22.50
L021	.007	8.00	.102	15.00	.429	14.00
L022	.009	12.50	.102	15.00	.736	18.00
L023	.02	12.50	.102	15.00	.43	16.00
L024	.01	16.50	.10	11.00	.41 L	9.50
L027	.0091	12.50	.09	8.00	.47 H	28.00
L029	.010 H	16.50	.093	12.00	.44	18.00
L030	.045	29.00	.050 VL	17.00	.759	34.00
L031A	.005	3.50	.075	22.50	.398 VL	11.00
L031B			.130 H	30.00	.400 VL	4.00
L032	.1607 VH	31.00	.2491 VH	34.00	.360 VL	2.00
L033	.022	24.00	.082	5.00	.460	26.00
L045	.015	16.50	.10	21.50	.420	12.00
L046	.004	2.00	.109	19.00	.44	18.00
L048	.0071	8.00	.086	14.00	.54 VH	34.00
L049	.011	20.00	.08	4.00	.50 VH	31.00
L050	.017	8.00	.1232	29.00	.45	26.00
L053	.007	8.00	.094	13.00	.406 L	9.50
L057	.01W	0.00	.072	1.00	.410 L	1.00
L058	.05W	0.00	.14 VH	31.50	.196 VL	22.50
L060	.02W	0.00	.10	21.50	.45	29.00
L061	.16 VH	30.00	.09	8.00	.49 VH	29.00
L062	.01	8.00	.09	8.00	.45	22.50
L063	.017	16.50	.12	21.50	.40 VL	2.00
L064	.016	5.00	.154 VH	21.50	.51 VH	32.50
MEDIAN			.100	18.00	.441	20.00
CONC.	.010		.099	16.50	.440	

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LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING	METHOD CODING
L002	208.00	23.111	9	VHVVH VL	TECHNICON TECHNICON 07112L
L003	154.00	20.000	6		AUTO ANALYZER
L004	181.50	20.167	9		
L006	150.00	20.000	6	HVH HVH HVHVVHVVH	
L007	242.00	30.250	8	HVH HVHVVHVVH	
L009	233.00	29.125	7		NITRATE ONLY
L010	170.00	21.250	8		CD-CU REDUCTION CO
L011	156.50	19.562	8	LVL	
L012	127.50	15.875	8	H	IC
L013	113.00	14.125	8	VH	CD RED. AUTO. ANAL.
L014	113.00	14.125	8		CHROMAT. IONIQUE
L019	209.00	26.125	9	HVH	RED-DIATON
L020	130.50	16.438	8	VLL L	IC
L021	130.50	16.438	8		AUTOMATED CADMIUM R
L022	145.00	18.125	8	H	AUTO. CADMIUM REDUC
L023	164.00	20.500	8		COLOURIMETRIC
L024	195.50	24.438	9		COLORIMETRIC
L027	69.00	7.667	9	VLL VL	COLORIMETRIC
L029	93.00	10.333	9	HVL	TECHNICON REDUCT.
L030	120.50	13.563	8	VHVVHVVH	
L031A	131.50	16.438	8		AUTO CD. REDUCTION
L031B	202.00	25.250	8	VL	AUTO CD. REDN
L033	71.00	8.875	8		AUTOMATED CD-REDUC
L045	163.50	20.438	9	HVHVVHVVH	AUTOANALYZER
L046	223.50	28.063	9	VH	TECHNICON
L048	131.50	16.438	9	VHL	AA HYDRAZINE-CUSO4
L049	106.00	13.250	9	VHL	IC
L050	161.00	20.125	8		CD-REDUCTION COLOR
L052	113.00	14.125	9	VL	
L053	147.00	18.375	6	VHL VH	IC.
L058	131.50	16.438	7	VH	IC
L060	157.00	22.125	7		TECHNICON AA II
L061	154.00	20.563	7		DIS. ANAL. HYD. RED.
L063	181.50	20.167	9	VHVVH	AUTO-CD-RED.
L065	171.50	21.438	8	VL	IC (DIONEX) MODEL 10
L066	183.00	22.875	8	VHVVH	ION CHROM.
L068	123.50	15.438	8	VH	
OVERALL AVERAGE RANK IS		17.106			

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF READING	METHOD CODING
L022	51.50	9.463	8	VLL L	AUTOMATED CADMIUM R
L011	56.00	7.667	9	VLL VL	BIASED LOW
L029	63.00	7.833	9	VL	BIASED LOW
L057	71.00	8.889	9	VL	BIASED LOW
L033	71.00	8.875	8	VL	
L063	71.00	8.875	8	VL	
L003	93.00	10.333	9	HVL	
L039	93.00	10.611	9	VLL	
L049	109.00	12.000	9	VLL	
L053	113.00	12.611	9	L	
L019	118.00	13.111	9		
L021	130.00	14.500	9		
L031A	120.00	15.063	8	HVL	
L066	123.00	15.375	8	VH	
L031B	31.00	15.750	2		INSUFFICIENT DATA
L013	127.00	15.875	8	H	
L050	141.00	17.889	9	VHL	
L023	145.00	18.125	8	H	
L045	163.00	18.167	9	VHL VH	
L058	131.00	18.788	7	VH	
L014	153.00	19.188	8	VH	
L006	160.00	20.000	8	VHV HH	
L000	181.00	22.167	9	H	
L024	164.00	22.500	9	VHH	
L048	170.00	22.500	8	VHH	
L048	191.00	23.278	9	VHH	
L001	164.00	23.333	9	VHH	
L002	157.00	23.429	7	VHV HH	
L024	209.00	23.683	9	VHV HH	
L054	189.00	23.833	8	VHV HH	
L023	223.00	23.833	9	VHV HH	
L033	209.00	23.833	8	VHV HH	
L007	209.00	23.833	8	VHV HH	
L009	233.00	23.833	7	VHV HH	
OVERALL AVERAGE RANK IS		17.106			

APPENDIX II: LABORATORY APPRAISALS

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ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS L0 02

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory, except for a high flag on sample No. 10

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: -

SULPHATE NON I.C.: Satisfactory

ACIDITY: No results reported

TOTAL ALKALINITY: Satisfactory, except for a high flag on sample No. 8

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory, except for a high flag on sample No. 2

SPECIFIC CONDUCTIVITY: Satisfactory, except for a high flag on sample No. 5

COLOUR: Satisfactory

REACTIVE SILICA: No results are flagged, however ranking indicates results are biased low

NITRATE + NITRITE: Samples 6 and 7 are flagged very high and flagged high on sample No. 8

L0 02

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 03

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory, except for a high flag on sample No. 6

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: No samples are flagged, however results are ranked biased low

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: Satisfactory

ACIDITY: No results reported

TOTAL ALKALINITY: Satisfactory, however there is insufficient data to
assess bias

GRAN TITRATION ALKALINITY: Flagged very high on sample No. 8 and very low on
sample No. 5

pH: Samples 3, 5, 7, and 9 are all flagged very low

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: Sample No. 1 and 3 are flagged low; the remaining results are insufficient
to assess bias

REACTIVE SILICA: Samples 3 and 7 are flagged high. Insufficient data to assess
bias

NITRATE + NITRITE: Satisfactory, except for a low flag on sample No. 7

LO 03

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 04

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: No results were flagged, however, ranking indicates results are biased low

POTASSIUM: Samples 1, 2, 3 and 9 are all flagged low; ranking indicates results are biased low

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Satisfactory

ACIDITY: No results reported

TOTAL ALKALINITY: Sample No. 2 is flagged low, ranking indicates results are biased low

GRAN TITRATION ALKALINITY: Samples 2, 3, 7 and 9 are flagged very low, samples 5 and 6 are flagged very high. Data appear to be erratic

pH: Flagged very low on samples 2, 3, 8, and 9, flagged low on sample 10. Ranking indicates results are biased low

SPECIFIC CONDUCTIVITY: Satisfactory, except for a very high flag on samples 5 and 6

COLOUR: Samples 1, 3, 5, 6, 7, 8, and 10 are all flagged very high

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory

LO 04

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 06

CALCIUM: Satisfactory, except for a very high flag on sample No. 10

MAGNESIUM: Samples 1, 7, 9 and 10 are flagged high. Ranking indicates results are biased high

SODIUM: Satisfactory

POTASSIUM: Samples 1, 2 and 8 are flagged very low and samples 3 and 6 are flagged low; ranking indicates results are biased low

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Sample 7 is flagged high and sample 10 is flagged very high

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: No results are flagged, however ranking indicates results are biased low

ACIDITY: No results reported

TOTAL ALKALINITY: Flagged low on samples 1 and 10; ranking indicates results are biased low

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: No results reported

REACTIVE SILICA: Sample 7 is flagged low; insufficient data to assess bias

NITRATE + NITRITE: Flagged high on sample 5 and very high on sample No. 7

LO 06

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 07

CALCIUM: No results reported

MAGNESIUM: No results reported

SODIUM: No results reported

POTASSIUM: No results reported

CHLORIDE I.C.: Samples 1, 7 and 10 are flagged high

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported.

GRAN TITRATION ALKALINITY: No results reported

PH: Flagged high on samples 3, 7, and 9

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Flagged very high on samples 1, 3, 5, 8, and 10; flagged high on sample No. 9. Ranking indicates results are biased high

LO 07

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 09

CALCIUM: Flagged low on sample 9 and 10

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory, except for a very high flag on sample No. 5

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Samples 3, 5, 6, 7, 9, and 10 are flagged very high. Sample 1 is flagged high. Ranking indicates results are biased high

LO 09

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 10

CALCIUM: Satisfactory, except for a low flag on sample No. 1

MAGNESIUM: Sample 3 is flagged very low, ranking indicates results are biased low

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Sample No. 7 is flagged low, otherwise the results are satisfactory

ACIDITY: Samples 5 and 6 are flagged low. Insufficient data to assess bias

TOTAL ALKALINITY: Insufficient data to assess bias

GRAN TITRATION ALKALINITY: No results reported

pH: Samples 1, 6, and 8 are flagged very low and Sample 3 low

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: Insufficient data to assess bias

REACTIVE SILICA: Satisfactory

NITRATE + NITRITE: Satisfactory

LO 10

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 10B

CALCIUM: No results reported

MAGNESIUM: No results reported

SODIUM: No results reported

POTASSIUM: No results reported

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: No results reported

ACIDITY: Satisfactory

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: No results reported

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: No results reported

LO 10B

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 11

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Samples 5, 6, and 10 are flagged very high and samples 3, 7, and 9 are flagged high; ranking indicates results are biased high

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory except for a very low flag on sample No. 10

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Satisfactory

ACIDITY: Satisfactory, except for a low flag on sample No. 7

TOTAL ALKALINITY: Insufficient data to assess bias

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory, except for a low flag on sample No. 6

COLOUR: Samples No. 3 is flagged high and samples 6, 7, 8, 9, and 10 are flagged very high

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Samples No. 7 is flagged very low and sample No. 5 is flagged low. Ranking indicates results are biased low

LO 11

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 12

CALCIUM: No results reported

MAGNESIUM: No results reported

SODIUM: No results reported

POTASSIUM: No results reported

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: No results reported

LO 12

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO13

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory, except for a high flag on sample 1

LO 13

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 14

CALCIUM: Satisfactory, except for a very high flag on sample No. 5

MAGNESIUM: Satisfactory, except for a low flag on sample No. 3

SODIUM: Satisfactory, except for a high flag on sample No. 5

POTASSIUM: Samples 3 and 6 are flagged very low

CHLORIDE I.C.: Sample 10 is flagged high and sample No. 5 is flagged low

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Flagged very high on samples 5 and 6

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: Satisfactory

pH: Flagged very high on sample No. 8, low flag on sample No. 6

SPECIFIC CONDUCTIVITY: Sample No. 5 and 6 are flagged very low, and sample No. 8 is very high

COLOUR: No results reported

REACTIVE SILICA: Satisfactory

NITRATE + NITRITE: Satisfactory

LO 14

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 16

CALCIUM: Satisfactory, except for a very high flag on sample 10

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Satisfactory

ACIDITY: Samples 1, 2, 3, 5, 7, and 8 flagged very high; Sample No. 9 flagged high, results are ranked biased high

TOTAL ALKALINITY: low flag on sample No. 1 and 2, overall ranking indicates results are biased low

GRAN TITRATION ALKALINITY: No results reported

pH: Flagged very low on sample No. 1, samples No. 2, 5, 7, and 8 are flagged low. Results are biased high

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: No results reported

LO 16

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 18

CALCIUM: No results reported

MAGNESIUM: No results reported

SODIUM: No results reported

POTASSIUM: No results reported

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: Sample No. 10 is flagged low; ranking indicates results are biased low

GRAN TITRATION ALKALINITY: Samples 5 and 6 are flagged very high

pH: Samples 1, 3, 8, and 9 are flagged very low and samples 2 and 7 are flagged low; results are biased low

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: No results reported

LO 18

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 19

CALCIUM: Satisfactory, except for a high flag on sample No. 3

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: Insufficient data to assess bias

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory

LO 19

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 20

CALCIUM: Satisfactory

MAGNESIUM: Samples 1 and 3 are flagged very high

SODIUM: Satisfactory

POTASSIUM: Satisfactory, except for a low flag on sample 3

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: Satisfactory

ACIDITY: Samples 3, 7, and 9 are flagged very high

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: Samples 5 and 6 are flagged very high

pH: Satisfactory

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: Satisfactory

NITRATE + NITRITE: Flagged high on samples 1 and 10, and very high on No. 3

LO 20

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 21

CALCIUM: Flagged low on samples 3, 6 and 10 and very low on No. 9; ranking indicates data is biased low

MAGNESIUM: Sample No. 2 is flagged low and Sample No. 3 is flagged very low

SODIUM: No samples have been flagged, however data is biased high

POTASSIUM: Satisfactory

CHLORIDE I.C.: Satisfactory except for a high flag on sample No. 1

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Sample 9 is flagged very high; ranking indicates results are biased high

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: Sample 10 is flagged very low, sample 2 is flagged high

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory

LO 21

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 22

CALCIUM: Sample No. 3 is flagged very high and samples 7, 9, and 10 are high;
ranking indicates results are biased high

MAGNESIUM: Samples 1, 7 and 10 are flagged very high and sample 9 is high.
Ranking indicates results are biased high

SODIUM: Satisfactory

POTASSIUM: Flagged very low on sample 10; insufficient data to assess bias

CHLORIDE I.C.: Samples 1, 5, 6, and 10 are flagged very high

CHLORIDE NON I.C.: Samples 1, 3, 6, and 9 are flagged very high; samples 5
and 10 are flagged high, ranking indicates results are biased high

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: Satisfactory, except for a high flag on sample No. 9

TOTAL ALKALINITY: Sample 3 and 8 are flagged very high

GRAN TITRATION ALKALINITY: No results reported

pH: Samples 1, 8 and 9 are flagged high, sample 10 is flagged very high

SPECIFIC CONDUCTIVITY: Flagged low on sample 1, 7 and 9; ranking indicates results
are biased low

COLOUR: Satisfactory

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Samples 7 and 9 are flagged low and sample 5 is flagged very low.
Ranking indicates results are biased low

LO 22

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 23

CALCIUM: Satisfactory, except for a very high flag on sample 3

MAGNESIUM: Sample No. 7 is flagged very low and sample No. 9 is flagged high

SODIUM: Satisfactory

POTASSIUM: Satisfactory except for a very high flag on sample 8

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Samples 8 and 9 are flagged very low and sample 1 is flagged low

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Satisfactory

ACIDITY: Satisfactory

TOTAL ALKALINITY: Satisfactory - except for a high flag on sample No. 1

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory - except for a high flag on sample No. 8

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: Sample 3 is flagged high, insufficient data to assess bias

REACTIVE SILICA: Insufficient data to assess bias

NITRATE + NITRITE: Satisfactory, except for a high flag on sample 7

LO 23

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 24

CALCIUM: Satisfactory

MAGNESIUM: Sample No. 8 is flagged very low and Sample No. 9 is flagged high

SODIUM: Satisfactory

POTASSIUM: Flagged low on samples 3 and 6

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: Satisfactory

GRAN TITRATION ALKALINITY: Satisfactory

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: Sample 1 and 3 are flagged very high

REACTIVE SILICA: Satisfactory

NITRATE + NITRITE: Satisfactory, except for a high flag on sample 6

LO 24

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 25

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Flagged very high on sample 3 and very low on No. 9 and high on No. 10;
data appear to be erratic

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: Sample 7 is flagged low and sample 9 very low. Ranking indicates results
are biased low

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: Samples 3, 7, 8, 9, and 10 are flagged very high and No. 1 very low; results
indicate data may be erratic

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: No results reported

LO 25

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 27

CALCIUM: Flagged low on samples 5 and 6

MAGNESIUM: Satisfactory, except for a high flag on sample No. 8

SODIUM: No results were flagged, however, ranking indicates results are biased low

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: Samples 1, 2, and 3 are flagged very high and samples 8 and 10 flagged high

GRAN TITRATION ALKALINITY: Satisfactory

pH: Samples 1, 5, 8 and 10 are flagged very high

SPECIFIC CONDUCTIVITY: Satisfactory, except for a very high flag on Sample 5

COLOUR: Sample 1, 2 and 3 are flagged high. Sample No. 6 is very high

REACTIVE SILICA: Satisfactory

NITRATE + NITRITE: Satisfactory

LO 27

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 28

CALCIUM: No results reported

MAGNESIUM: No results reported

SODIUM: No results reported

POTASSIUM: No results reported

CHLORIDE I.C.: Samples 1, 2, 3, 5, 6, 7, 9, and 10 are all flagged very high and
Sample 8 is flagged very low. Ranking indicates results are biased high

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: No results reported

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: No results reported

LO 28

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 29

CALCIUM: Satisfactory, except for a very high flag on sample No. 9

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: Satisfactory, except for a low flag on sample No. 9

TOTAL ALKALINITY: Satisfactory

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory, except for a slight high flag on No. 2

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: No results reported

REACTIVE SILICA: No results are flagged, however ranking indicates results are biased low

NITRATE + NITRITE: Flagged very low on No. 3 and 7 and low on No.5. Ranking indicates results are biased low

LO 29

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 30

CALCIUM: No results reported

MAGNESIUM: No results reported

SODIUM: No results reported

POTASSIUM: No results reported

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: No results reported

ACIDITY: Satisfactory

TOTAL ALKALINITY: Satisfactory, except for a high flag on sample No. 3

GRAN TITRATION ALKALINITY: Satisfactory

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: Sample 3, flagged high; insufficient data to assess bias

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Flagged high on sample No. 1 and very low on sample No. 7

LO 30

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 31A

CALCIUM: Satisfactory, except for a very low flag on sample No. 3

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Satisfactory

ACIDITY: No results reported

TOTAL ALKALINITY: Flagged low on sample No. 1; insufficient data to assess bias

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: Satisfactory, except for a low flag on sample No.5

REACTIVE SILICA: Satisfactory

NITRATE + NITRITE: Flagged high on sample No. 3 and very low on No. 7

LO 31A

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO31B

CALCIUM: No results reported

MAGNESIUM: No results reported

SODIUM: Satisfactory

POTASSIUM: No results reported

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory on the two results reported,

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: The two results reported are satisfactory,

ACIDITY: No results reported

TOTAL ALKALINITY: Insufficient data

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory on the two results reported. Insufficient data to assess bias

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory on the two results reported

LO 31 B

YOUR LABORATORY NUMBER IS LO32

CALCIUM: Samples 1, 5, and 6 are flagged very high, sample 8 is flagged high; results are biased high

MAGNESIUM: Satisfactory, except for a high flag on sample No. 6

SODIUM: Satisfactory

POTASSIUM: Sample 1 is flagged very high and sample 3 and 6 are flagged very high

CHLORIDE I.C.: Satisfactory, except for a high flag on sample No. 8

CHLORIDE NON I.C.: Samples 3, 5, 6, 8 and 9 are all flagged very high

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: Satisfactory, except for a high flag on sample 8

ACIDITY: Flagged very low on samples 7 and 9, flagged low on No. 10; ranking indicates results are biased low

TOTAL ALKALINITY: Sample No. 8 is flagged very high

GRAN TITRATION ALKALINITY: Satisfactory, except for a low flag on sample No. 1

pH: Satisfactory, except for a low flag on sample No. 1

SPECIFIC CONDUCTIVITY: Sample 5 is flagged very high and No. 9 high, ranking indicates results are ranked biased high

COLOUR: Satisfactory

REACTIVE SILICA: Flagged high on samples 1 and 3

NITRATE + NITRITE: Flagged very high on samples 1, 3, 5 and 10

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 33

CALCIUM: Samples 2 and 6 are flagged very low; samples 3 and 9 are flagged low; Samples 1 and 5 are flagged very high. Data appears to be erratic

MAGNESIUM: Sample No. 5 is flagged very high, No. 9 is very low and No. 10 flagged low. Data are erratic. There is insufficient data to assess bias.

SODIUM: Sample No. 2 is flagged high and No. 9 very high, however, there is insufficient data to assess bias

POTASSIUM: Sample 1 is flagged very high, There is insufficient data to assess bias

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Insufficient data to assess bias

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Insufficient data to access bias

ACIDITY: Insufficient data to assess bias

TOTAL ALKALINITY: Sample No. 3 is flagged high. There is insufficient data to assess bias

GRAN TITRATION ALKALINITY: No results reported

pH: Samples 8 and 10 are flagged very low

SPECIFIC CONDUCTIVITY: Satisfactory, except for a very low flag on sample No. 6

COLOUR: No results reported

REACTIVE SILICA: Insufficient data to assess bias

NITRATE + NITRITE: Sample No. 9 is flagged very low, ranking indicates results are biased low

LO 33

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 42

CALCIUM: Satisfactory, except for a very low flag on sample No. 2

MAGNESIUM: Satisfactory

SODIUM: Satisfactory, except for a low flag on Sample No. 1

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Sample 5 is flagged very high and Sample 3, 9 and 10 are very high

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Seven out of the nine samples reported are flagged very high; Ranking indicates results are bias high

ACIDITY: Eight out of the nine results reported are flagged very high, ranking indicates results are biased high

TOTAL ALKALINITY: Nine out of nine samples are flagged very high, ranking indicates results are biased high

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Eight out of nine samples are flagged very high, results are ranked biased high

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: No results reported

LO 42

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 45

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Satisfactory

ACIDITY: Satisfactory on the 5 results reported

TOTAL ALKALINITY: Sample No. 1 is flagged low, insufficient data to assess bias

GRAN TITRATION ALKALINITY: No results reported

pH: 5 out of 9 reported results are flagged low, ranking indicates results are biased
low

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: Satisfactory

REACTIVE SILICA: Satisfactory

NITRATE + NITRITE: Satisfactory, except for a high flag on sample No. 5

LO 45

YOUR LABORATORY NUMBER IS L046

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory, except for a high flag on No. 1

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Samples 3, 5, and 6 are flagged very high, sample 9 is flagged high, results are biased low

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Samples 2, 6, 7 and 10 are flagged low, ranking indicates results are biased low

ACIDITY: Satisfactory, except for a very high flag on sample No. 7

TOTAL ALKALINITY: Flagged low on samples 1 and 10, overall results are ranked biased low

GRAN TITRATION ALKALINITY: No results reported

pH: No results reported

SPECIFIC CONDUCTIVITY: Samples 5, 6, 7, 8, 9 and 10 are flagged very low. Results are ranked biased low.

COLOUR: Insufficient data to assess bias

REACTIVE SILICA: Samples 1, 2, 3 and 6 are all flagged very low, insufficient data to assess bias

NITRATE + NITRITE: Very high flag on samples 5, 6, 7, and 9

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 48

CALCIUM: Flagged low on sample 1 and 9

MAGNESIUM: Samples 3 and 6 are flagged low

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: Satisfactory

ACIDITY: No results reported

TOTAL ALKALINITY: Satisfactory, except for high flag on sample 10

GRAN TITRATION ALKALINITY: No results reported

pH: Sample 2 and 8 flagged low, Sample 3 flagged very low

SPECIFIC CONDUCTIVITY: Satisfactory, except for high result on sample 5

COLOUR: No results reported

REACTIVE SILICA: Satisfactory except for a high flag on sample No. 2

NITRATE + NITRITE: Very high flag on sample No. 7 and high flag on sample No. 9

LO 48

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO49

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory, except for a very high flag on sample 1

POTASSIUM: All nine samples have been flagged very high, ranking indicates results are bias high

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Samples 1, 2, 5, and 7 are flagged very low; samples 3 and 10 are low. Samples 6 and 8 are high, data appears to be erratic

ACIDITY: Insufficient data to assess bias

TOTAL ALKALINITY: Satisfactory

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory, except for a very high flag on sample No. 1

SPECIFIC CONDUCTIVITY: Satisfactory, except for a very high flag on sample No. 5

COLOUR: Sample No. 3 is flagged low, insufficient data to assess bias

REACTIVE SILICA: Samples 1, 2, 3, 7 and 9 are flagged very high and sample 6 is high. Ranking indicates results are biased low

NITRATE + NITRITE: Flagged very low on samples No. 5 and 6

LO 49

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 50

CALCIUM: No results reported

MAGNESIUM: No results reported

SODIUM: No results reported

POTASSIUM: No results reported

CHLORIDE I.C.: Satisfactory, except for a very high flag on Sample No. 7

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory, except for a high flag on sample No. 5

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: No results reported

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Very high flag on sample No. 5 and a low flag on No. 7

LO 50

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS L053

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: No results reported

SULPHATE NON I.C.: Satisfactory

ACIDITY: Satisfactory

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: Satisfactory

pH: Satisfactory

SPECIFIC CONDUCTIVITY: No results reported

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory, except for a low flag on No. 7

L0 53

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 57

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Sample No. 3, 5, 6, 8 and 9 all flagged very high, Sample 7 high, ranking indicates results are biased high

POTASSIUM: Samples 1 and 5 are flagged very high

CHLORIDE I.C.: No results reported

CHLORIDE NON I.C.: Samples 6, 8, 9, and 10 are all flagged very low; results are biased low

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: Satisfactory, high flags on Sample No. 10

TOTAL ALKALINITY: Flagged high on Sample No. 1

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: Sample No. 1 and 3 flagged very high and 2 and 8 flagged high

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory, except for a very low flag on Sample No. 7

LO 57

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 58

CALCIUM: Satisfactory

MAGNESIUM: Satisfactory

SODIUM: Satisfactory

POTASSIUM: Satisfactory

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: Satisfactory, except for a high flag on sample 10

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: No results reported

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory, except for a very low flag on sample No. 1

SPECIFIC CONDUCTIVITY: Satisfactory, except for a very high flag on sample No. 5

COLOUR: Insufficient data

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Flagged very high on sample 3 and 10 and low on sample No. 6

LO 58

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS L060

CALCIUM: Flagged high on samples 3, 7, 9 and 10, overall ranking indicates results are-biased high

MAGNESIUM: Samples 2, 7, 9, and 10 are flagged very high; samples 1 and 3 are flagged high, ranking indicates results are biased high

SODIUM: Samples 1 and 10 are flagged high

POTASSIUM: All 9 samples have been flagged very high, ranking indicates results are biased high

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: Flagged high on samples 3 and 7

TOTAL ALKALINITY: Flagged low on sample 9, ranking indicates results are biased low

GRAN TITRATION ALKALINITY: No results reported

pH: Sample No. 8 is flagged very high, Samples 9 and 10 are low

SPECIFIC CONDUCTIVITY: Samples 1, 2, 3, 6 and 9 are flagged very low. Samples 5, 7, and 8 are low. Results are biased low

COLOUR: No results reported

REACTIVE SILICA: Satisfactory, excpet for a high flag on sample No. 7

NITRATE + NITRITE: Flagged very high on sample 7, sample 9 is flagged high

L0 60

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 61

CALCIUM: Insufficient data to assess bias; only 3 results reported

MAGNESIUM: Insufficient data to assess bias, however the 3 results reported are satisfactory

SODIUM: Sample No. 8 is very low, insufficient data to assess bias, only 2 results reported

POTASSIUM: Sample No. 6 is flagged very high, insufficient data to assess bias

CHLORIDE I.C.: Insufficient data reported to assess bias

CHLORIDE NON I.C.: Insufficient data to assess bias

SULPHATE I.C.: Insufficient data to assess bias

SULPHATE NON I.C.: Insufficient data to assess bias

ACIDITY: Insufficient data to assess bias

TOTAL ALKALINITY: Insufficient data to assess bias

GRAN TITRATION ALKALINITY: Insufficient data to assess bias

pH: Satisfactory on the 3 results reported, however there is insufficient data to assess bias

SPECIFIC CONDUCTIVITY: Insufficient data to assess bias

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory on the 3 samples reported, insufficient data to assess bias

LO 61

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 62

CALCIUM: Satisfactory, except for a very low flag on sample No. 1

MAGNESIUM: Satisfactory, except for a high flag on sample No. 6

SODIUM: Satisfactory

POTASSIUM: Satisfactory, except for a low flag on sample No. 1

CHLORIDE I.C.: Samples 1, 7, and 10 are flagged very high

CHLORIDE NON I.C.: Samples 5, 8, and 9 are flagged very high, ranking indicates results are bias high

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: Flagged very high on samples 1, 2 and 3

ACIDITY: Flagged very low on samples 1, 2, 5 and 6. Flagged low on samples 3 and 8, ranking indicates bias low

TOTAL ALKALINITY: Flagged very high on samples 2, 3, 8 and 10. Ranking indicates bias high

GRAN TITRATION ALKALINITY: No results reported

pH: Flagged very high on 5 and 10. Flagged very low on 9 and low on No. 7, data are erratic

SPECIFIC CONDUCTIVITY: Samples 3 and 6 are flagged very low, sample 2 is low

COLOUR: No results reported

REACTIVE SILICA: Sample No. 3 is flagged low, ranking indicates results are bias low

NITRATE + NITRITE: Samples 1 and 5 are flagged very high, sample 6 is high

LO 62

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 63

CALCIUM: Flagged very low on samples 3, 7, and 9. ranking indicates results are bias low

MAGNESIUM: Satisfactory, except for a low flag on sample No. 9

SODIUM: No samples are flagged, however, ranking indicates results are bias low

POTASSIUM: Satisfactory

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: Satisfactory

SULPHATE I.C.: Flagged high on sample 1 and very high on No. 3

SULPHATE NON I.C.: Flagged very high on samples 1, 2 and 3

ACIDITY: Satisfactory

TOTAL ALKALINITY: Flagged very high on samples 2, 3, 5, 6 and 8 and flagged high on 1 and 10

GRAN TITRATION ALKALINITY: No results reported

pH: Samples 1, 8 and 10 are flagged very high, sample 2 flagged high

SPECIFIC CONDUCTIVITY: Sample 2 and 3 are flagged very high, sample 5 and 6 very low and sample 8 is high. Data appears to be erratic

COLOUR: Sample 1, 2 and 5 flagged very low. Sample 3 flagged low

REACTIVE SILICA: Flagged very high on sample 2, 3 and 9; insufficient data to assess bias

NITRATE + NITRITE: Satisfactory, except for a low flag on No. 7

LO 63

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS LO 64

CALCIUM: Sample 7 is flagged very low and samples 9 and 10 low

MAGNESIUM: Satisfactory, except for a high flag on sample 1

SODIUM: Satisfactory

POTASSIUM: Samples 1 and 2 are flagged very low; samples 3, 6, 8 and 9 are low;
Samples 7 and 10 are very high. Data are erratic.

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: Satisfactory

TOTAL ALKALINITY: Satisfactory

GRAN TITRATION ALKALINITY: No results reported

pH: Satisfactory

SPECIFIC CONDUCTIVITY: Satisfactory

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Very high flag on samples 7 and 9

LO 64

ATTACHMENT 1
MARCH 19, 1984

YOUR LABORATORY NUMBER IS L066

CALCIUM: Sample No. 5 is flagged very low; sample No. 6 is flagged very high

MAGNESIUM: Satisfactory, except for a very low flag on sample No. 5

SODIUM: Satisfactory, except for a low flag on sample 5

POTASSIUM: Satisfactory, except for a very low flag on sample 5

CHLORIDE I.C.: Satisfactory

CHLORIDE NON I.C.: No results reported

SULPHATE I.C.: Satisfactory

SULPHATE NON I.C.: No results reported

ACIDITY: Flagged low on samples 5 and 9

TOTAL ALKALINITY: No results reported

GRAN TITRATION ALKALINITY: No results reported

pH: Flagged very high on sample 5 and high on sample 8

SPECIFIC CONDUCTIVITY: Flagged very low on samples 5 and 9

COLOUR: No results reported

REACTIVE SILICA: No results reported

NITRATE + NITRITE: Satisfactory, except for a very high flag on sample 2

L0 66

Reference: 1983 ASTM Volume 11.01 water 1, Section II, pg D4210-83

GLOSSARY OF TERMS USED IN THE
EVALUATION OF INTERLABORATORY RESULTS

Satisfactory: Quite acceptable, "good results".

Erratic: A set of results for a given characteristic is deemed erratic when both high and low flags are assigned.

Out of Control: An analytical system is said to be out of control when it has demonstrated the ability to perform adequately and produces an extreme result or results. For an example, consider this set of results obtained by laboratory #3 on total phosphorus for Study #24.

Sample No.	Reported Value	Median	Difference
1	9	9.5	-.5
2	5	4.5	.5
3	2T	3	-1
4	8	8	0
5	2T	2.5	-.5
6	9	8	1
7	28	28	0
8	18	17	1
9	23	23.7	-.7
10	16	15	1
11	35	35.8	-.8
12	75	78.7	-3.8
13	58	59	-1
14	110	90	20

Given the excellent results obtained on samples 1 through 13, the result on sample 14 indicates that the analytical system was out of control.

Bias: A set of results is said to be biased when the set exhibits a tendency to be either higher or lower than some standard - the standard which has been used in the analysis of our studies thus far has been the performance of all other participating laboratories. The ranking procedure employed in testing for bias is described in W.J. Youden's paper, "Ranking Laboratories by Round-Robin Tests from Precision Measurement and Calibration, H.H. Ku, Editor, NBS Special Publication 300 - Volume 1, U.S. Government Printing Office, Washington, D.C., 1969. In this paper, Youden establishes the rationale for evaluating laboratories' performance by ranking results. In our use of the procedure there is about 1 chance in 20 of deeming a set of results biased when in fact it is not, that is, $\alpha = 0.05$.

W: A "W" code is used with a reported result when no measurement was possible due to no response of the instrument to the sample. The "W" is preceded by the smallest determinative division that can be used in the units used in reporting.

T: The "T" code is used with values between the Criterion of Detection and the "W" value. The Criterion of Detection is commonly thought of by many as the limit of detection.

Lower limit for Use of Basic Assceptable Error, Basic Acceptable Error; and Concentration Error Increment:

These terms define the acceptable difference from the median of results (target value) that is allowed without a result being

flagged either low or high. For a sample whose target value is at or below the lower limit for use of basic acceptable error the basic acceptable error is used to determine the range of acceptable deviations.

For example: Suppose that the lower limit for use of basic acceptable error has been set at 10 $\mu\text{g/L}$ and the basic acceptable error is 1.0 $\mu\text{g/L}$, if a target (median) value for a sample is 5 $\mu\text{g/L}$, then any reported result within the range 5 ± 1.0 or 4.0 to 6.0 $\mu\text{g/L}$ would be considered acceptable.

Since for almost all substances it appears that the variability of results increases in concentration, an allowance is made for the increased variability for those samples whose target values are above the lower limit for use of basic acceptable error. The allowance is added to the basic acceptable error, and it is calculated by multiplying the concentration error increment by the difference between the target value and the lower limit for use of basic acceptable error.

For example: If a target value for a sample is 21 $\mu\text{g/L}$, and the lower limit for use of basic acceptable error is 10 $\mu\text{g/L}$, the difference between them is $21 - 10 = 11$ $\mu\text{g/L}$. Multiplying the difference by the concentration increment, $11 \mu\text{g/L} \times 0.10$, gives 1.1 $\mu\text{g/L}$ to determine the acceptable difference 21.0 ± 2.1 or 18.9 to 23.1 $\mu\text{g/L}$ would be considered acceptable and would not be flagged.

In general, the values chosen for the basic acceptable error and the concentration error increment are selected so that several of the participating laboratories will have demonstrated the ability to do the analyses satisfactorily. In a sense the values represent state of the art for analysis of the round robin samples.

Flag: A result is flagged high H when its value is greater than the median (target) value plus the acceptable difference but not greater than the median plus 1.5 times; a result greater than 1.5 times the acceptable difference is flagged with VH. Similarly, a result less than the median minus 1.5 times the acceptable difference is flagged L a lower result is flagged VL.

Acceptable Difference or Acceptable Deviation:

The absolute values of the maximum difference between a result and the target value which will not be flagged.

